

RESEARCH NOTE 84-17

MAINTENANCE PERFORMANCE SYSTEM (ORGANIZATIONAL)
CHARACTERISTICS OF EFFECTIVE MOTOR SERGEANTS:
RESEARCH LEADING TO A CURRICULUM SPECIFICATION

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The purpose of this effort is to develop the Maintenance Performance System- Organizational (MPS-O) which is an integrated system for measuring maintenance performance, diagnosing performance problems, taking corrective actions, and providing training. This report describes a study to determine the character- istics of effective motor sergeants and to develop a specification for a curriculum to prepare prospective motor sergeants for thier job.		

SUMMARY

Background

The armor/mechanized infantry battalion motor sergeant plays a key role in maintaining the mission-ready status of the vehicles in his unit. As a middle-level maintenance manager he must balance his time between administrative and technical duties in an environment characterized by multiple varied demands competing for his time. Since the motor sergeant's job is not unique to any single MOS, there is no single training course currently available to develop the skills necessary to performing the needed management actions effectively.

Objective

The objective of this research was to identify the characteristics of effective motor sergeants and translate them into a specification for a training curriculum.

Approach and Results

A survey consisting of 100 candidate items was developed and administered to experienced mechanics, motor sergeants, and motor officers to identify those characteristics that were most important for effective performance of motor sergeants. The 36 most highly rated characteristics were translated and described in observable, testable, and trainable behavioral terms. These "behaviors" were then used as the basis for developing a curriculum specification for training new motor sergeants, which is presented in the buff-colored pages of the report. This specification should be considered as a blueprint for curriculum developers to use in developing lesson plans, training media, and supporting materials.

Recommendations

For eventual implementation of a curriculum, three conditions must be met: policy-makers at DA and TRADOC must specify and provide the needed resources to develop and administer a motor sergeant training program; a prototype program must be developed, administered, and evaluated under conditions reflecting those that would prevail in Army-wide implementation; and results of the evaluation will be used to modify the prototype curriculum before complete training packages are approved.

Conclusion

A previous step in this research identified the range of activities a motor sergeant could do. Knowing the range of these activities plus the characteristics of an effective motor sergeant identified in this study, provided a concise profile of the ideal, effective motor sergeant. This profile is presented on the next page. The ultimate purpose of the work reported here was to help prospective motor sergeants meet this ideal.

PROFILE OF THE EFFECTIVE MOTOR SERGEANT

The duties required of the company or battalion motor sergeant are varied and demanding. He is responsible for diagnosing mechanical problems in vehicles, instructing maintenance personnel on corrective action, training equipment operators in preventive maintenance procedures, controlling tools and equipment, and scheduling maintenance service. His supervisory duties include overseeing shop operations, maintaining equipment records and the PLL, and itemizing repair parts.* All of this is done under control of a unit commander or technical officer.

Like most middle-level managers of technically-linked work, the effective motor sergeant must divide his time between administrative and technical activities. On the administrative side, an effective motor sergeant delegates responsibility clearly, which allows the unit to run smoothly in his absence. He listens to his men's complaints, and rewards them for showing initiative. He monitors his unit's maintenance status by keeping close tabs on personnel, vehicles, and resources. When needed, he can perform clerical duties like completing TAMMS, PLL, and other forms and records, because of his familiarity with these systems.

Though the effective motor sergeant need not be a first-rate mechanic himself, he should recognize that skill in others. He keeps his technical knowledge of equipment and procedures current so that repair errors may be recognized either in the course of the repair or before the vehicle is released from the shop. Also, the effective motor sergeant is not afraid to "get his hands dirty." He demonstrates new repair tasks to his men, and troubleshoots faults on equipment when his mechanics can not.

In sum, the effective motor sergeant is a dynamic, well-organized, technically skilled mid-level maintenance manager who directs, teaches, and counsels his mechanics.

*United States Army Ordnance Center and School. **Organizational maintenance operations**, FM 29-2. Aberdeen Proving Ground, Maryland, April 1981.



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HOW TO USE THIS REPORT

This report contains information for three distinct audiences: senior training policy-makers concerned with the development of doctrine and the allocation of resources training motor sergeants, curriculum developers for a proposed motor sergeant training program who are primarily concerned with content, format and training methods, and training researchers in ARI and TRADOC who have a methodological interest in the work. We believe that the information in this report will be seen in perspective by reading the sections in sequence. However, each audience may wish to examine, at the outset, only the section closest to their own interests. We have identified the appropriate sections below.

Policy-makers

The translation of behavioral components into a curriculum specification on buff-colored paper beginning on page 25, provides a summary of the topics that should be covered in the curriculum. The section titled **Action Required to Implement the Curriculum Specification**, beginning on page 47, briefly reviews the three key steps that must be taken as part of curriculum implementation.

Curriculum Developers

The curriculum specification, on buff-colored paper beginning on page 28, presents training topics related to the important behavioral characteristics of effective motor sergeants, and presents suggestions on how the topics may be incorporated in a curriculum. Appendix C presents a list of Army training resources, current during this research, that may be used in developing the curriculum.

Training Researchers

Training researchers and other behavioral scientists in ARI and TRADOC will find that the methodology for deriving the characteristics of effective motor sergeants, and the associated behavioral components model for curriculum development are described generally in the technical sections on pages 6 through 25 and in detail in Appendices A and B.

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INTRODUCTION

This report describes a research effort to identify the important characteristics of effective motor sergeants in an armor/mechanized infantry battalion, and to translate those characteristics into observable, trainable, and testable behaviors that can be described in training terms. The end product of this research is specification of the important elements of such a curriculum.

BACKGROUND

The Army Research Institute is concerned with improving organizational maintenance. The key figure in the organizational maintenance hierarchy is the motor sergeant in an armor battalion. Figure 1 illustrates his need for certain abilities and characteristics including **planning** maintenance activities, **managing** the mechanics under his control, **scheduling** jobs and **assigning** mechanics to them, providing **liaison** among superiors and co-workers, **training** mechanics plus **learning** new skills himself, having detailed **technical knowledge** of maintenance techniques and the Army maintenance system, having **technical skills** in performing maintenance and completing maintenance documentation, possessing certain **personal qualities** to enhance interaction with his mechanics, and possessing certain **work habits** to enhance his own effectiveness.

Unfortunately there is no organized, integrated and current training available to help new motor sergeants acquire all their needed abilities and characteristics, because motor sergeants can come from almost any technical MOS. For example, the motor sergeant might hold a primary MOS as an automotive tank mechanic (63N), a turret repairman (45N), or even a senior tank crewman NCO (19E). The lack of consistent MOS responsibilities and MOS training for the job of motor sergeant has made it difficult to assign responsibility for his training. Often, a company's new motor sergeant is simply assigned to the job with no preparation.

Although the Army is constantly producing useful training resources, no real attempt has been made to address this training issue based on a systematic approach.

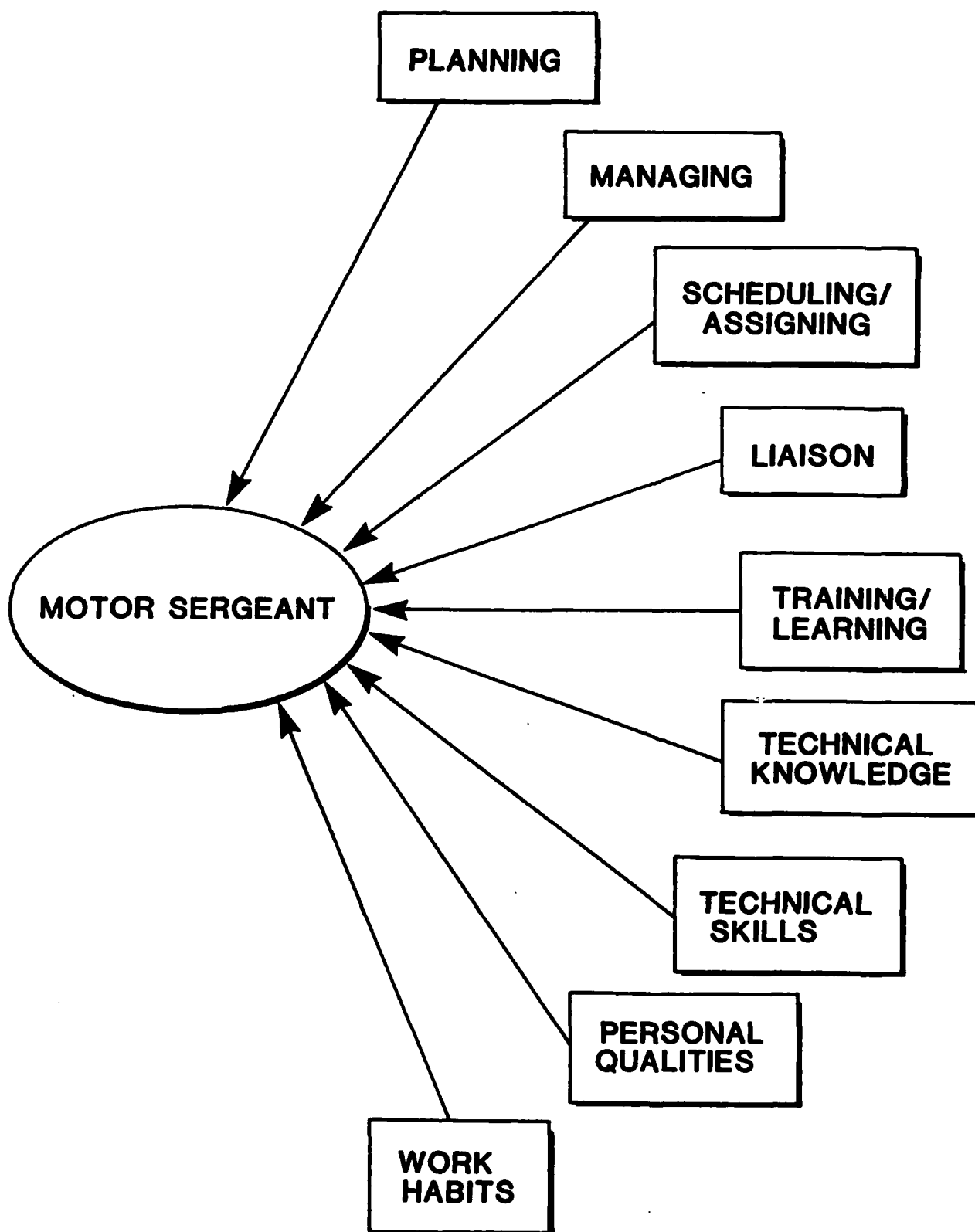


Figure 1. Categories of motor sergeant's abilities and characteristics.

It has become clear in this research that piecemeal efforts to provide trained motor sergeants are costly and doomed to failure. As a solution we propose an integrated approach to training based on identifying the characteristics of effective motor sergeants and providing a set of curriculum specifications based on these key characteristics. Typical training approaches use the job-task to be done as the criterion. We have concentrated on a criterion linked to the behaviors the motor sergeant must invoke to achieve his objective rather than on defining his job as the criterion-governing training.

OBJECTIVES

The three objectives of the research shown in Figure 2 are discussed below.

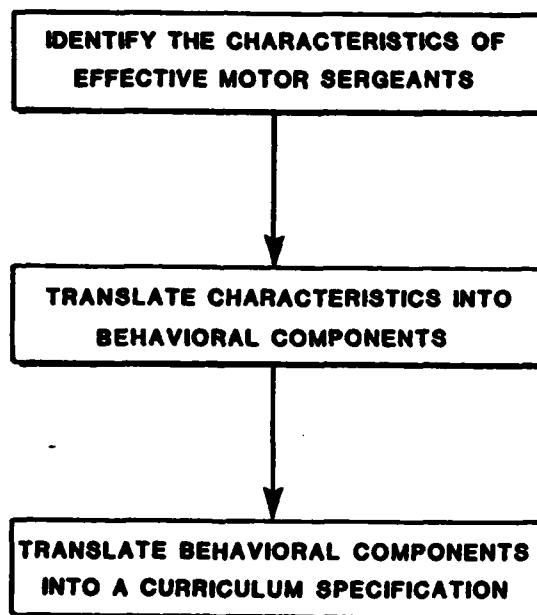


Figure 2. Sequence of research objectives.

Identify the Characteristics of Effective Motor Sergeants

The first objective was to identify the specific characteristics associated with effective motor sergeants through surveys of knowledgeable, experienced personnel in combat units. For this report, "characteristics" includes the categories of abilities and characteristics listed in Figure 1. A key criterion for identifying specific characteristics was that they must have the capability of being described in terms that would permit them to be described and translated as trainable behaviors. Characteristics such as "keen intellect" and "inner strength" while undoubtedly associated with effectiveness in any position, are too general and intangible and cannot easily be described in specified behavioral components of training.

Translate Characteristics Into Behavioral Components

The second objective was to translate the characteristics of effective motor sergeants into a set of behavioral components suitable for incorporation into training. These behavioral components had to meet a three-part criterion before being accepted for consideration as curriculum specification items.

The criteria were:

- The important components of behavior had to be **observable**. We had to address what effective motor sergeants did, not how they thought or felt.
- The important components of behavior had to be **discrete**. We had to focus on easily described, specific activities that could be separated from other aspects of behavior. For example, specific activities like "consults other experts" or "listens to men's complaints" were preferred over abstractions like "is able to play it by ear."
- The important components of behavior had to be **testable**. We had to identify objective criteria to measure the quality of performance of a given behavior. This was essential to providing feedback to the trainee so he could improve his performance.

Taken together, the three properties above ensured that a component of behavior was **trainable**, which was the ultimate criterion for this phase of the research.

Translate the Behavioral Components Into a Curriculum Specification

The third objective was to translate the behavioral components of an effective motor sergeant into a set of statements that would specify the nature of

an effective training curriculum. The present research was not chartered to develop the curriculum itself. Curriculum development depends to a great degree on the resources that could be allocated to implementing a training program. These are not only unknown at this time but defining their availability, and associated costs are outside our research charter. The curriculum specification had to include and discuss the topics in a typical maintenance training program for motor sergeants, however, and suggest methods for handling each topic.

ORGANIZATION OF THIS REPORT

The next three sections describe the achievement of each of the three objectives. A subsequent section describes three recommended steps necessary to implement the specified curriculum. Finally, a set of appendices provides supporting technical information, and a list of training resources that will be valuable to the eventual curriculum developer.

IDENTIFYING THE CHARACTERISTICS OF EFFECTIVE MOTOR SERGEANTS

OVERVIEW

A survey of experienced maintenance personnel from battalions in two mechanized infantry divisions was conducted to identify the most important characteristics of effective motor sergeants. The major steps in developing the survey, conducting it, analyzing the data, and extracting the important characteristics are described in this section. A more detailed account is provided in Appendix A. A copy of the survey instrument is included as Appendix B. To clarify the steps in the developmental sequence refer to Figure 3.

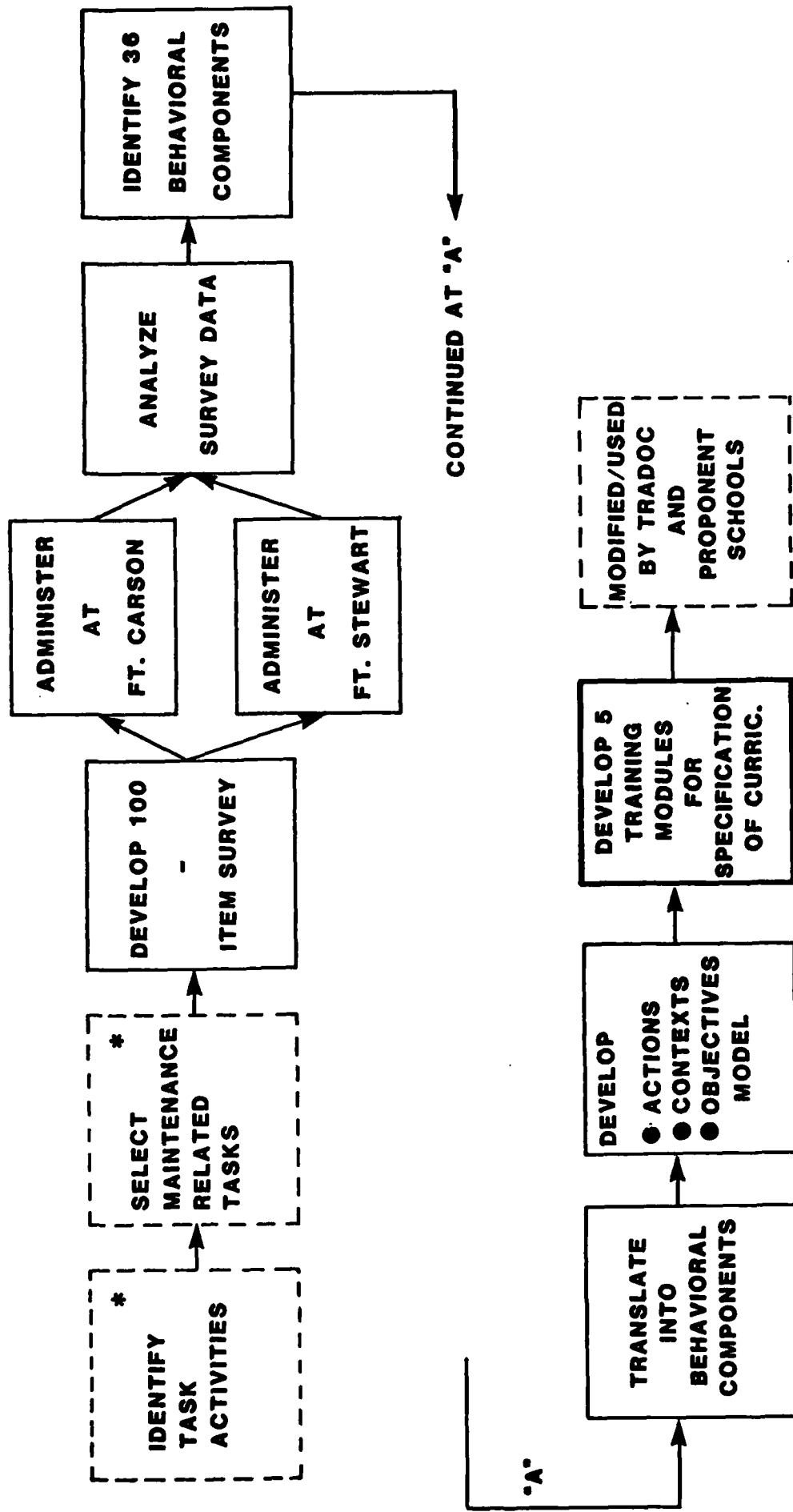
SURVEY DEVELOPMENT

Development of the survey instrument was guided by the underlying need to use the information obtained as a contributing factor in outlining training specifications. The content of the survey items therefore emphasized identification of abilities and characteristics related to behavior that was observable, discrete, and testable, as discussed earlier.

In constructing survey items, the nine general categories of characteristics depicted in Figure 1 were used as a guide. These categories were based on the results of a comprehensive task analysis of all aspects of motor sergeant activities that had been conducted earlier in the project. They proved to be consistent with the general domains of supervisor activity typically cited in studies of supervisor effectiveness.¹

Obviously, in the complex range of tasks performed by the Motor Sergeant many activities were found which were peripherally related to maintenance effectiveness. For example, critical survival skills such as use of gas masks, applying first aid to a severed artery or even directing perimeter defense of the

¹Vineberg, R., & Joyner, J. N. **Prediction of job performance: Review of military studies** (NPRDC TR 82-37). Carmel, CA: Human Resources Research Organization, March 1982.



* Previously performed research steps.

Figure 3. Major steps in development of curriculum specification for motor sergeants' training.

motor pool in battle were not directly related to maintenance skills. As such, they were neither selected nor included in the gamut of characteristics that later represented his maintenance effectiveness.

A number of items were developed for each category; each item was related to a specific, potentially important characteristic of a motor sergeant. The final instrument contained 100 items. The number of items representing each of the nine categories is indicated in Table 1.

TABLE 1
NUMBER OF SURVEY ITEMS REPRESENTING EACH
CATEGORY OF CHARACTERISTICS

Category	Number of Survey Items
Planning	7
Managing	16
Scheduling/Assigning	7
Liaison	9
Training/Learning	11
Technical Knowledge	11
Technical Skills	11
Personal Qualities	16
Work Habits	12
TOTAL	100

Each item was rated by respondents on a 10-point scale where 1 represented low importance.

SURVEY ADMINISTRATION

Surveys were administered to 105 organizational maintenance personnel at Fort Stewart, Georgia and Fort Carson, Colorado. Three levels of personnel were represented: mechanics, motor sergeants, and motor officers. Table 2 shows the distribution of respondents by rank and site. Surveys were administered in an interview format, with an Anacapa Sciences, Inc., senior scientist collecting data from one or two respondents at a time.

TABLE 2
DISTRIBUTION OF RESPONDENTS BY RANK AND SITE

Rank of Respondent	SURVEY SITE		Total
	Ft. Stewart	Ft. Carson	
Mechanic	25	29	54
M/Sgt	11	16	27
Motor Officer	10	14	24
TOTAL	46	59	105

DATA ANALYSIS

A variety of statistical techniques were used to assess the reliability of the data, to determine the consistency among respondents of different ranks and at different sites, to determine the feasibility of pooling the data across respondents to simplify the identification of the characteristics that were rated as most important, and to rank the most important characteristics. These techniques are described in detail in Appendix A.

MOST IMPORTANT CHARACTERISTICS

A subset of 36 characteristics met the statistical criterion for being rated "most important" by the pooled sample of 105 respondents. These characteristics are listed in Table 3. The characteristics are organized by the nine general categories of characteristics shown in Figure 1 and used earlier to balance inclusion of different categories of survey items. The original item numbers from the survey instrument were used here to permit easy reference to the entire list of items in Appendix B.

The characteristics listed in Table 3 have been rephrased from the original wording in the survey items, into action statements that begin with a verb; the subject, "effective motor sergeants," is implicit in each statement. This rephrasing was done to remove inconsistencies in description from the list of characteristics and to make easier subsequent translation of the characteristics into trainable actions.

TABLE 3
CHARACTERISTICS OF EFFECTIVE MOTOR SERGEANTS

Survey Item Number	CHARACTERISTICS CATEGORY
PLANNING	
2.	Can react to unusual demands or crisis situations.
36.	Relates organizational maintenance to unit mission readiness.
76.	Allocates resources, such as tools and men, to accomplish maintenance mission.
MANAGING	
14.	Organizes maintenance section so it can run smoothly in absence.
55.	Lets mechanics show initiative and take action on their own.
63.	Displays own initiative in solving problems on job-related matters.
69.	Listens to suggestions on technical matters from his men.
78.	Is aware of personnel's whereabouts during working hours.
SCHEDULING/ASSIGNING	
15.	Manages time effectively.
33.	Rotates tasks among mechanics of all experience levels.
51.	Plans and organizes work day.
53.	Schedules personnel and work effectively.
68.	Ensures that men know exactly what is expected of them.
LIAISON	
1.	Maintains good relationships with other officers, men, M/Sgts.
22.	Discusses maintenance needs with mechanics and crew.
92.	Consults other "experts" on technical problems.
TRAINING/LEARNING	
44.	Guides and counsels mechanics on corrective maintenance procedures.
49.	Updates own skills and knowledge.
71.	Recognizes men who need training on maintenance tasks.
TECHNICAL KNOWLEDGE	
4.	Understands and interprets maintenance records and documents.
19.	Recognizes critical errors on jobs in progress.
37.	Keeps abreast of technical changes and modifications to equipment and publications.
42.	Evaluates quality of work on a finished job.
66.	Obtains needed repairs from other sources if the normal supply system breaks down.
88.	Has detailed knowledge of how TAMMS operates.
TECHNICAL SKILLS	
17.	Gives hands-on demonstrations of new tasks to mechanics.
24.	Has hands-on ability to check and inspect work.
43.	Has detailed knowledge of special maintenance tools and test equipment.
47.	Has high degree of skill in completing and checking Army forms.
72.	Has detailed knowledge of troubleshooting.
PERSONAL QUALITIES	
18.	Makes men aware that he is available to listen to complaints.
21.	Makes specific efforts to motivate personnel.
31.	Stands up for beliefs at risk of personal difficulties.
41.	Does not let personal views influence treatment of mechanics.
70.	Supports mechanics in confrontation with superior officers.
WORK HABITS	
64.	Works effectively under time/deadline pressures.

TRANSLATION OF CHARACTERISTICS INTO BEHAVIORAL COMPONENTS

OVERVIEW

Before curriculum specifications could be described, the most important characteristics governing a motor sergeant's effectiveness had to be translated into a set of behavioral components suitable for training. This translation was done in two steps: first, the characteristics were translated into key behaviors. Second, the key behaviors were analyzed and translated into their logical behavioral components. This set of behavioral components thus guided curriculum specifications. Each step is discussed below.

TRANSLATION OF CHARACTERISTICS INTO KEY BEHAVIORS

The 36 characteristics were translated into paraphrased, compact key behaviors to eliminate syntactic differences in the wording of characteristics, and to facilitate comparative analysis related to the content of each item. Three criteria guided this translation:

- **Consistency**—Descriptions of all key behaviors were recast into a common format wherever possible.
- **Brevity**—Needless words were eliminated, leaving most key behaviors in a terse verb-object format.
- **Clarity**—Potentially ambiguous or undefined terms were avoided.

Using these criteria, the characteristics were reviewed by stages. The characteristics descriptions were examined for irrelevant grammatical differences, phrasing peculiarities, and variations in tense. After this review, key behaviors were described in the present tense, with the action verb occupying the first position in the phrase. In some cases a weak verb was replaced by a stronger verb that was logically consistent with the intention of the characteristic. The revised characteristics were again reviewed to eliminate needless words. Redundant terms were eliminated or replaced. More concise synonyms were substituted in some cases. The final behavioral descriptions were analyzed for potential ambiguities or imprecision and problems were corrected.

The 36 key behaviors resulting from this translation process were carefully described to preserve the intended meaning of the original survey items. Stripping away syntactic discrepancies and redundant wordings, which had been used to make the original survey items more palatable to a unique audience, yielded compact descriptions of key behaviors that provided a solid basis for further translation into behavioral components.

TRANSLATION OF KEY BEHAVIORS INTO BEHAVIORAL COMPONENTS

Key behaviors were translated into a set of behavioral components via an intensive, detailed analysis. The goal of this analysis was to produce a logical structured taxonomy of behavioral components that fully described the key behavioral characteristics of an effective motor sergeant. Three criteria guided this analysis:

- **Parsimony**--The number of distinct behavioral components was held to a minimum: A core set of components was constructed to be applicable to a wide variety of key behaviors. A new behavioral component was added to the taxonomy only if its function could not be served by an existing component.
- **Consistency**--The same behavioral component was invoked to describe those aspects of motor sergeant activity involving a number of key behaviors. For example, all key behaviors involving verbal communication were translated into the same behavioral component, "talks with."
- **Trainable content**--The content of the behavioral components had to be observable, discrete, and testable, as described in the **Introduction**.

KEY BEHAVIORS AND BEHAVIORAL COMPONENTS

The 36 key behaviors and the associated structure of behavioral components are described in Table 7. But before studying Table 7 the reader should review the descriptions that follow, of some of the major constituents of the table.

The terms action verbs, contexts and objectives are defined below.

Action verbs--The 12 action verbs used are listed below in Table 4. Since these actions determine the organization of the training curriculum modules, choosing actions to describe key behaviors was done carefully.

TABLE 4

LISTING OF ALL ACTIONS USED IN STRUCTURE OF BEHAVIORAL COMPONENTS

Actions	Definition
Analyzes	Describes current information, classifies new information, infers relationship among different types of technical information.
Asserts	Emphasizes the importance of, insists, does not take "no" for an answer.
Checks	Observes, measures, verifies.
Focuses	Ignores extraneous input, concentrates on relevant information.
Tracks	Follows, monitors, remembers, records, preserves
Maintains Control	Ignores excessive demands, persists in goal-directed behavior, keeps emotions in check.
Manipulates	Physically handles parts, operates tools.
Reads	Understands, remembers, and interprets written information.
Rewards	Provides objects or conditions valued positively by the recipient.
Solicits	Seeks or requests new information or help.
Talks With	Reliably exchanges verbal information, gives verbal directions that are understood, gives verbal commands that are obeyed
Translates	Transforms written and verbal information into appropriate decisions and actions.

Contexts—Context refers to the surroundings or circumstances in which an action takes place. The contexts comprise the framework for bounding each statement in the structure. Contexts are categorized in three ways: people, personal, and materials. The most frequently appearing contexts relate to people, and include co-workers, experts, mechanics, superiors, and social networks. For some components, the motor sergeant provides his own personal context, as with stress, attention, and duties. The most diverse contexts in the structure cover material-related categories, and include current unit status, job problems, potential solutions, rosters, mission readiness requirements, technical publications,

mechanics' task experiences, maintenance status documents, TAMMS, tools and parts and Army records. Since some contexts are self-evident, a selected list of contexts is shown in Table 5.

TABLE 5
LISTING OF CONTEXTS USED IN STRUCTURE OF BEHAVIORAL COMPONENTS

Contexts (Selected)	Definition
Co-workers	Any mechanics, crewmen, officers, or other motor sergeants who work in armor battalion maintenance and have some contact with the motor sergeant in question.
Maintenance Status Document	Any written record that describes the past or current state of repair readiness of vehicles in the motor sergeant's unit.
Mechanic Task Experience	Number of times a mechanic has performed tasks requisite for his MOS.
Social Network	Set of interrelated social contacts among personnel in the maintenance community who have access to potentially useful resources.
Technical Publication	Any written document that pertains to the operation of equipment, procurement of parts and tools, or the repair of armored vehicles.

Objectives—Objectives appear as "bulleted" phases beneath the stem of each statement in the structure. Objectives refers to the intended goal of the action (e.g., to establish job schedule), to list the materials needed to achieve the goal (e.g., documents and regulations), or to gain information needed to contemplate goal-directed action (e.g., basis of decision). A selected list of objectives is shown in Table 6.

TABLE 6
LISTING OF OBJECTIVES USED IN STRUCTURE OF BEHAVIORAL COMPONENTS

Objectives (Selected)	Definition
Critical Steps	Those steps in a sequence of corrective maintenance steps that must be performed correctly for the vehicle to operate properly.
Individual Job Performance	Quality of repair work done by a single mechanic on some task.
Supervisory Roles	Unofficial status, assumed by one of the motor sergeant's subordinates or colleagues, for functioning as a supervisor in the motor sergeant's absence.
Team Performance	Quality of repair work done by a group of mechanics on some task.
Undocumented Modifications	Changes in maintenance procedure, specific to a certain vehicle type, that have not yet appeared in writing.

In general, the complexity of a behavior described in the "key behaviors" column is reflected in the number of associated actions and contexts described in the "behavioral components" column. Some behaviors, like "consults technical experts," may simply be translated into a single action and context, "talks with technical experts." Other behaviors, such as "monitors whereabouts of mechanics," are more complex and require several actions and contexts to be adequately described. The specific objectives for each action and context were selected to provide a representative sample of the potentially infinite set of detailed objectives that would be encountered in the maintenance environment.

An annotated example (shown as Figure 4) illustrates the relationship among action, context and objectives.

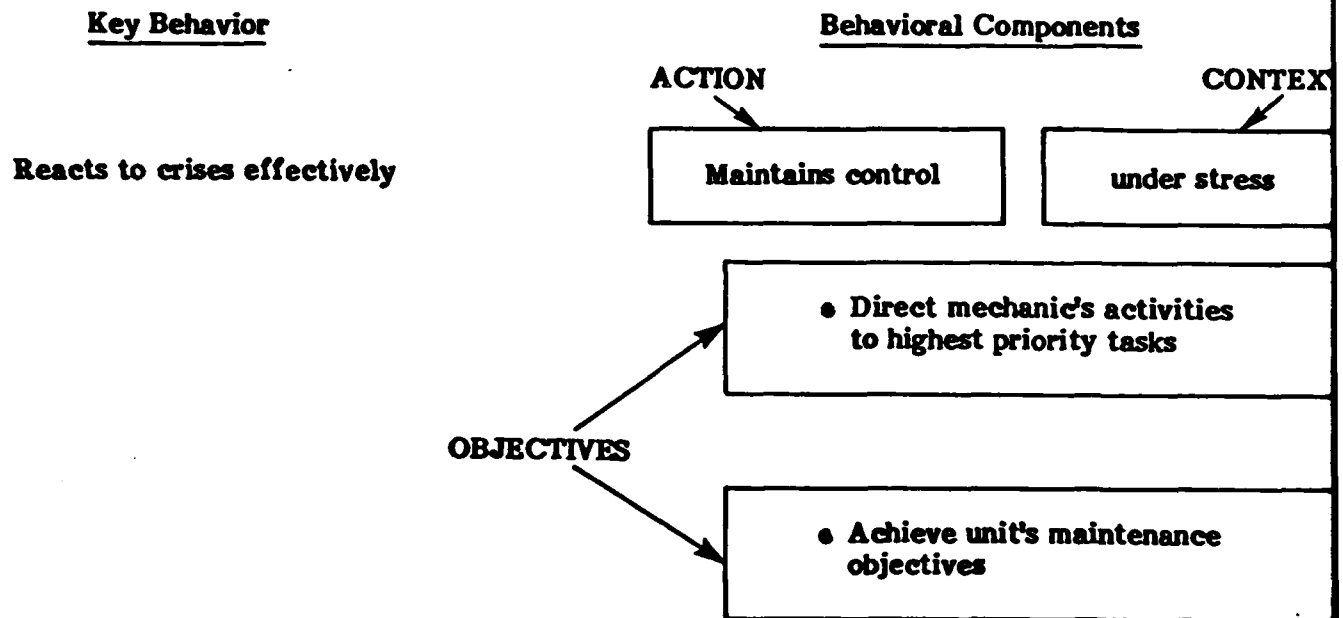


Figure 4. Example of action verb, context and objectives relationships.

Survey item numbers are presented next to the key behaviors to facilitate reference to the characteristics in Table 3 and to items in the complete survey instrument in Appendix B. The behavioral components in the right-hand column form a well-defined hierarchy of action verbs, contexts, and objectives.

TABLE 7
TRANSLATION OF CHARACTERISTICS INTO KEY BEHAVIORS
AND A STRUCTURE OF BEHAVIORAL COMPONENTS

Survey Item Number	Key Behavior Translated From Characteristics	Behavioral Components
2.	Reacts to crises effectively	Maintains control under stress to: <ul style="list-style-type: none"> ● Direct mechanics' activities to highest priority tasks ● Achieve unit's performance objectives
36.	Relates organizational maintenance to mission readiness	Translates mission readiness requirements into: <ul style="list-style-type: none"> ● List of vehicles requiring corrective maintenance ● List of vehicles requiring preventive maintenance ● Job schedule
76.	Allocates resources effectively	Analyzes current unit status to: <ul style="list-style-type: none"> ● Identify job requirements ● Identify skill levels of mechanics ● Identify resource requirements ● Identify available resources ● Prioritize jobs ● Match jobs to mechanics according to skill Talks with co-workers to: <ul style="list-style-type: none"> ● Establish job responsibilities ● Establish job schedule ● Establish supervisory roles
14.	Organizes unit to run smoothly in his absence	Analyzes current unit status to: <ul style="list-style-type: none"> ● Identify job requirements ● Identify skill levels of mechanics ● Identify resource requirements ● Identify available resources ● Prioritize jobs ● Match jobs to mechanics according to skill Talks with co-workers to: <ul style="list-style-type: none"> ● Establish job responsibilities ● Establish job schedule ● Establish supervisory roles

TABLE 7 (Continued)

Survey Item Number	Key Behavior Translated From Characteristics	Behavioral Components
55.	Allows mechanics to show initiative	Talks with mechanics to: <ul style="list-style-type: none"> ● Establish non-restrictive atmosphere Rewards mechanics for: <ul style="list-style-type: none"> ● Self-initiated problem-solving actions
63.	Displays problem-solving initiative	Analyzes job problem to: <ul style="list-style-type: none"> ● Generate potential solutions Analyzes potential solutions to: <ul style="list-style-type: none"> ● Identify acceptable solutions
69.	Listens to technical suggestions from mechanics	Solicits guidance from mechanics about: <ul style="list-style-type: none"> ● Maintenance procedures ● Job scheduling ● Resource management.
78.	Monitors whereabouts of mechanics	Analyzes roster to identify each mechanic's: <ul style="list-style-type: none"> ● Weekly duty assignment ● Daily work status Talks with co-workers to verify each mechanic's: <ul style="list-style-type: none"> ● Weekly duty assignment ● Daily work status Keeps track of each mechanic's: <ul style="list-style-type: none"> ● Weekly duty assignment ● Daily work status
15.	Manages his time effectively	Analyzes his required duties to: <ul style="list-style-type: none"> ● List all pertinent tasks ● Prioritize pertinent tasks Focuses his attention on his highest priority tasks
33.	Rotates tasks evenly among mechanics	Keeps track of mechanics' task experiences Analyzes current unit status to: <ul style="list-style-type: none"> ● Identify job requirements ● Identify skill levels of mechanics ● Prioritize jobs ● Match jobs to mechanics according to skill level and previous task experiences

TABLE 7 (Continued)

<u>Survey Item Number</u>	<u>Key Behavior Translated From Characteristics</u>	<u>Behavioral Components</u>
51.	Organizes his time effectively	Analyzes his required duties to: <ul style="list-style-type: none"> ● List all pertinent tasks ● Prioritize pertinent tasks
53.	Schedules job assignments	Analyzes current unit status to: <ul style="list-style-type: none"> ● Identify job requirements ● Identify skill levels of mechanics ● Prioritize jobs ● Match jobs to mechanics according to skill
68.	Clarifies performances expectations to his mechanics	Talks with mechanics to: <ul style="list-style-type: none"> ● Establish job responsibilities ● Establish job schedule ● Establish supervisory roles
1.	Maintains relationships with co-workers	Talks regularly with co-workers to: <ul style="list-style-type: none"> ● Establish himself in a social network ● Identify sources of information, materials, expertise ● Identify social relationships among co-workers
22.	Discusses maintenance needs with mechanics and crewmen	Talks with co-workers to: <ul style="list-style-type: none"> ● Identify job requirements ● Identify resource requirements ● Identify available resources ● Establish job responsibilities ● Establish job schedules
92.	Consults technical experts	Talks with technical experts to obtain information about: <ul style="list-style-type: none"> ● Troubleshooting and diagnosis ● Maintenance actions ● Tools, parts, and equipment ● Documents and regulations ● Undocumented modifications ● Alternative supply sources
44.	Advises mechanics on corrective maintenance procedures	Talks with mechanics about: <ul style="list-style-type: none"> ● Troubleshooting and diagnosis ● Maintenance actions ● Tools, parts, and equipment ● Documents and regulations ● Undocumented modifications

TABLE 7 (Continued)

Survey Item Number	Key Behavior Translated From Characteristics	Behavioral Components
49.	Maintains up-to-date skills and knowledge	Reads technical publications about: <ul style="list-style-type: none"> ● Troubleshooting and diagnosis ● Maintenance actions ● Tools, parts, and equipment ● Regulations Talks with technical experts about: <ul style="list-style-type: none"> ● Troubleshooting and diagnosis ● Maintenance actions ● Tools, parts, and equipment ● Documents and regulations ● Undocumented modifications
71.	Identifies men who need maintenance training	Keeps track of mechanic's task experiences Analyzes mechanics' task experiences to: <ul style="list-style-type: none"> ● Establish a unit average for each task ● Identify mechanics below unit average for each task
4.	Interprets maintenance documents effectively	Reads technical publications about: <ul style="list-style-type: none"> ● Troubleshooting and diagnosis ● Maintenance actions ● Tools, parts, and equipment ● Regulations Translates information from technical publications into: <ul style="list-style-type: none"> ● Appropriate maintenance steps ● Appropriate sequences of steps Reads maintenance status documents to: <ul style="list-style-type: none"> ● Identify job requirements ● Identify skill levels of mechanics ● Identify resource requirements ● Identify available resources ● Prioritize jobs ● Match jobs to mechanics according to skill Analyzes information from maintenance status documents into: <ul style="list-style-type: none"> ● Establish job responsibilities ● Establish job schedule ● Establish supervisory roles

TABLE 7 (Continued)

Survey Item Number	Key Behavior Translated From Characteristics	Behavioral Components
19.	Recognizes critical errors during job performance	<p>Reads technical publications about:</p> <ul style="list-style-type: none"> ● Troubleshooting and diagnosis ● Maintenance actions ● Tools, parts, and equipment ● Regulations <p>Translates information from technical publications into:</p> <ul style="list-style-type: none"> ● Appropriate maintenance steps ● Appropriate sequences of steps <p>Checks mechanics performing maintenance to:</p> <ul style="list-style-type: none"> ● Discriminate critical steps ● Evaluate performance of critical steps
37.	Maintains up-to-date knowledge of equipments and publications	<p>Reads technical publications about:</p> <ul style="list-style-type: none"> ● Troubleshooting and diagnosis ● Maintenance actions ● Tools, parts, and equipments ● Regulations <p>Talks with technical experts about:</p> <ul style="list-style-type: none"> ● Troubleshooting and diagnosis ● Maintenance actions ● Tools, parts, and equipments ● Documents and regulations ● Undocumented modifications
42.	Evaluates quality of completed jobs	<p>Reads technical publications about:</p> <ul style="list-style-type: none"> ● Troubleshooting and diagnosis <p>Talks with technical experts about:</p> <ul style="list-style-type: none"> ● Troubleshooting and diagnosis <p>Translates information from technical publications and expert advice into:</p> <ul style="list-style-type: none"> ● Indicators of mission-ready equipment ● Indicators of faulty equipment <p>Checks completed jobs for:</p> <ul style="list-style-type: none"> ● Indicators of mission-ready equipment ● Indicators of faulty equipment

TABLE 7 (Continued)

<u>Survey Item Number</u>	<u>Key Behavior Translated From Characteristics</u>	<u>Behavioral Components</u>
66.	Obtains parts from outside sources when necessary	<p>Keeps track of unit status to:</p> <ul style="list-style-type: none"> ● Identify unacceptable resource delays <p>Talks with technical experts to obtain information about:</p> <ul style="list-style-type: none"> ● Alternative supply sources <p>Solicits assistance from his social network to obtain:</p> <ul style="list-style-type: none"> ● Needed resources from alternative sources
88.	Maintains detailed knowledge of TAMMS	<p>Reads TAMMS documentation to learn:</p> <ul style="list-style-type: none"> ● Characteristics of the components of TAMMS ● Relationships among the components of TAMMS <p>Analyzes information from TAMMS printout to:</p> <ul style="list-style-type: none"> ● Keep track of unit status ● Identify job requirements
17.	Demonstrates new tasks using hands-on technique	<p>Keeps track of mechanics' task experiences to:</p> <ul style="list-style-type: none"> ● Identify tasks that are new to individual mechanics ● Identify tasks that are new to the unit <p>Translates information from technical publications into:</p> <ul style="list-style-type: none"> ● Appropriate steps for new tasks ● Appropriate sequences of steps <p>Personally manipulates tools and parts to demonstrate:</p> <ul style="list-style-type: none"> ● Appropriate maintenance steps for new tasks ● Appropriate sequences of steps for new tasks
24.	Evaluates work using hands-on technique effectively	<p>Reads technical publications about:</p> <ul style="list-style-type: none"> ● Troubleshooting and diagnosis <p>Talks with technical experts about:</p> <ul style="list-style-type: none"> ● Troubleshooting and diagnosis <p>Translates technical publications and expert advice into:</p>

TABLE 7 (Continued)

Survey Item Number	Key Behavior Translated From Characteristics	Behavioral Components
24.	(Continued)	<ul style="list-style-type: none"> ● Indicators of mission-ready equipment ● Indicators of faulty equipment Personally manipulates tools and parts to identify: <ul style="list-style-type: none"> ● Indicators of mission-ready equipment ● Indicators of faulty equipment
43.	Maintains knowledge of special tools and test equipment	Reads technical publications about: <ul style="list-style-type: none"> ● Special tools ● Test equipment Talks with technical experts about: <ul style="list-style-type: none"> ● Special tools ● Test equipment ● Undocumented modifications
47.	Completes and checks Army forms and records effectively	Analyzes Army forms and records to: <ul style="list-style-type: none"> ● Identify all required types of information Analyzes previously recorded information on forms and records to: <ul style="list-style-type: none"> ● Determine accuracy ● Correct mistakes ● Derive, where possible, missing information from completed information ● Obtain remaining information to complete the form or record
72.	Troubleshoots effectively	Reads technical publications about: <ul style="list-style-type: none"> ● Troubleshooting and diagnosis Talks with technical experts about: <ul style="list-style-type: none"> ● Troubleshooting and diagnosis Translates information from technical publications and expert advice into: <ul style="list-style-type: none"> ● Indicators of mission-ready equipment ● Indicators of faulty equipment Personally manipulates tools and parts to demonstrate: <ul style="list-style-type: none"> ● Appropriate maintenance steps for new tasks ● Appropriate sequences of steps for new tasks

TABLE 7 (Continued)

Survey Item Number	Key Behavior Translated From Characteristics	Behavioral Components
18.	Encourages mechanics to air complaints	Solicits feedback from mechanics to identify: <ul style="list-style-type: none"> ● Sources of interpersonal conflict ● Sources of job-related dissatisfaction
21.	Motivates mechanics	Talks with mechanics to: <ul style="list-style-type: none"> ● Identify effective rewards Rewards mechanics for improving: <ul style="list-style-type: none"> ● Individual job performance ● Team performance
31.	Stands up for own beliefs	Asserts to co-workers: <ul style="list-style-type: none"> ● Basis of decisions ● Necessary actions
41.	Treats mechanics impartially	Analyzes his attitudes toward each mechanic, based on mechanic's: <ul style="list-style-type: none"> ● Personality ● Individual job performance ● Team performance Rewards mechanics only on basis of: <ul style="list-style-type: none"> ● Individual job performance ● Team performance
70.	Defends mechanics to superiors	Asserts to superiors: <ul style="list-style-type: none"> ● Basis of mechanics' job performance ● Basis of mechanics' personal actions
64.	Works effectively under time pressure	Maintains control under stress to: <ul style="list-style-type: none"> ● Direct mechanic's activities to highest priority tasks ● Achieve unit's performance objectives Analyzes his required duties to: <ul style="list-style-type: none"> ● List all pertinent tasks ● Prioritize pertinent tasks Focuses his attention on his highest priority tasks

TRANSLATION OF BEHAVIORAL COMPONENTS INTO A CURRICULUM SPECIFICATION

The structure of behavioral components in Table 7 was reduced to the 12 action verbs and their associated contexts and objectives (see Tables 4, 5 & 6). This eliminated high redundancy caused by interdependencies among the 36 characteristics. The 12 action verbs were grouped according to similarity. These groups were ordered according to their logical priority in the execution of supervisory duties. These groups were then arranged into five modules representing major blocks of the curriculum specification. Figure 5 describes the modules in detail.

Overview of the Curriculum Modules

Each module was developed from the **actions, contexts and objectives** described in Table 7 as they related to the structure of behavioral components. The skills to be trained in each module concern observable behaviors that are also testable. Test and evaluation are assumed to be integral parts of any training program.

Each of the five modules covers skills that the effective motor sergeant must have. However, if training in all of these skills is not feasible, selection of modules for training should follow the ranked module numbers.

The **content** of the curriculum specification is a composite drawn from applied research in instructional psychology, experience in developing similar training programs in military and commercial settings, basic research in learning, and extensive field experience in military maintenance.

The specification has been written so it can be implemented under a variety of resource availability conditions. For example, a low-budget, live-instructor, seminar approach could cover the most salient features of the curriculum in 3-4 days. A high-budget, mixed-media approach could productively spend several weeks in turning out well-prepared new motor sergeants. We have not, of course, attempted to develop a curriculum at this time. Not only are there skilled curriculum development teams already available in TRADOC establishments but the variables of time, location, quantity of trainees, location of training, training resource development and cost are unknown to the writers at this time.

**1. PROCESSING
INFORMATION**

Covers skills that are mandatory for an effective motor sergeant. A strong argument could be made that the skills covered in this module should be used as selection criteria for promoting mechanics to motor sergeant, rather than topics for a training curriculum.

2. SUPERVISING

Covers skills that are fundamental to managing and instructing a team of mechanics. Ideally, tests based on these skills could also serve as selection criteria for motor sergeant promotions.

3. COMMUNICATING

Covers skills that determine the degree to which the motor sergeant can effectively utilize skills from the first two modules.

**4. ENHANCING
PERSONAL
EFFECTIVENESS**

Covers skills that determine the degree to which the motor sergeant can be personally productive in the battalion work environment.

**5. ENHANCING
WORK
ENVIRONMENT**

Covers skills that the motor sergeant can use to determine the levels of personnel productivity and morale and enhance them where required.

Figure 5. The five modules specified for a motor sergeant training curriculum.

The ingredients (i.e., specification) for a curriculum have been identified-- now they must be assembled in the most cost-effective way. Comments are made in the section dealing with actions required (page 47) on the issues affecting implementation.

Each module of the specification is discussed in detail in the section following.

CURRICULUM SPECIFICATION

MODULE 1: PROCESSING INFORMATION

This module covers three actions that are essential to effectiveness of a motor sergeant: **reads, translates, and analyzes**. These actions are so fundamental that they should be included in an instrument for selecting motor sergeants. Once standards for these actions were defined, prospective motor sergeants could be tested against the norms. The curriculum should provide refresher training to enhance these basic skills; should provide training in analysis for those motor sergeants who have otherwise adequate general skills; and should test for minimum proficiency. Persons not passing the test should receive remedial training in these skills or be dropped from motor sergeant status. Recommendations on the sequence of presenting the material are provided at the end of this module.

Action	Context	Objective
A. READS		
Adequate reading skills are a mandatory requirement for an effective motor sergeant. A wide variety of tests are available to evaluate reading speed and comprehension. Setting a standard for comprehension, at least, should be established and applied to prospective motor sergeants.	1. Technical Publications (8)* The curriculum should introduce the motor sergeant trainee to samples of the technical publications that he may use in his job. It is unlikely that the curriculum can cover all relevant materials comprehensively, but sample reading assignments should be given and tests for reading comprehension should be administered. The objective of this part of the curriculum is to determine whether the trainee can read and understand technical publications.	To acquire information on: <ul style="list-style-type: none"> • Troubleshooting and diagnosis • Maintenance actions (preventive and corrective • Tools, parts, and equipment • Regulations • Special tools (circulars, bulletins) • Test equipment (circulars, bulletins)
	2. Maintenance Status Documents (1) The curriculum should introduce the motor sergeant trainee to all maintenance status documents he will use in his unit. If his unit does not have the ARI Maintenance Performance System (Organizational) (MPS(O)), the TAMMS, covered later, will form the core of this document listing. Instruction and practice on how to read the MPS(O)) reports should be included.	To achieve these goals: <ul style="list-style-type: none"> • Identify job requirements • Identify skill levels of mechanics • Identify resource requirements • Identify available resources • Prioritize jobs • Match jobs to mechanics according to their skill level
	3. TAMMS Documentation (1) The curriculum should introduce the motor sergeant trainee to those aspects of TAMMS that he must deal with regularly.	<ul style="list-style-type: none"> • To understand the characteristics of the various components of TAMMS that relate to the unit.

B. TRANSLATES

The essence of translates is being able to transform written (and verbal information) into appropriate decisions and actions. While reads focuses on skill in comprehending written information, translates focuses on skill in deciding on the actions that follow from particular information to accomplish given objectives. Effective translation also requires skill in deciding on the most appropriate sequence of actions.

1. Technical Publications (6)

Instruction and practice in this part of the curriculum should build skills in translating information from technical publications to meet the goals listed in the objectives column. The last two objectives cover visual (including indications from instruments), auditory, tactile (vibration, temperature, etc.), olfactory (smell of burning oil, insulation, etc.), and other clues that distinguish equipment that is in good working order from equipment that is faulty or in poor condition. Evaluation tests should be developed to determine how well trainees are able to translate technical information into maintenance actions. Substandard performance may suggest familiarization training is needed or may even determine if the trainee should be dropped from motor sergeant status.

2. Maintenance Status Documents (1)

A key part of the curriculum should include demonstrations and subsequent exercises on how to translate maintenance status documents into appropriate decisions and actions. One may simply read documents to identify job requirements, skill levels, etc., as mentioned earlier, but translating that information into team action represents higher level management skills. A detailed review of the current management literature would result in developing a compact, straightforward system for performing this translation. Whatever system is ultimately developed, it must be demonstrated clearly,

Overall appreciation and understanding of TAMMS would be enhanced if motor sergeants also understood how their input to the system affected higher-level decision-making in the Army's overall maintenance efforts.

- To understand the logical relationships among those components.

To identify:

- Appropriate maintenance steps (corrective and preventive)
- Appropriate sequences of steps
- Indicators of mission-ready equipment
- Indicators of faulty equipment

Goals are to:

- Establish job responsibilities
- Establish the job schedule
- Establish supervisory roles

*Numbers in parentheses refer to the number of key behaviors in Table 4 that are affected by a given context.

MODULE 1: PROCESSING INFORMATION (Continued)

Action	Context	Objective
2. Maintenance Status Documents (Continued)		
	appropriate exercises must be developed, and a system for measuring achievement must be developed and applied. If the motor sergeant trainee's unit does not have MPS(O), he may have to develop his own set of status documents to provide him with unique status information.	
3. Mission Readiness Requirements (1)		
	The curriculum should show the motor sergeant trainee how to translate memos, orders, verbal information, and any other information that might pertain to command expectations about the company's mission readiness into vehicle lists and schedules. Although the final objective of this analysis, establishing a job schedule, was covered under "translating maintenance status documents," it is important for the motor sergeant trainee to distinguish when mission readiness requirements goals must drive company maintenance actions to the exclusion of other goals such as conducting on-the-job training. The motor sergeant trainee should be trained to be aware of fluctuations in the cycle of company activities and trained to plan appropriately.	To develop: <ul style="list-style-type: none"> • A prioritized list of vehicles that require corrective maintenance • A prioritized list of vehicles that require preventive maintenance • A job schedule
4. TAMMS Documentation (1)		
	TAMMS does not provide the motor sergeant with a very good tool for considering maintenance status, because equipment reports are not summarized at the company level. However it is possible to develop status summaries from data on TAMMS forms. Since the motor sergeant reviews and sometimes completes TAMMS forms, he is in a good position to develop simple summaries.	<ul style="list-style-type: none"> • To keep track of the unit status (from an equipment perspective) • To identify job requirements

C. ANALYZES

The third action in Module 1, **analyzes**, denotes skill in abstracting meaning from, or deriving relationships among, different types of technical information. In some cases these relationships may be obvious. In others, he may have to study the written word closely. In certain cases, the motor sergeant may have to derive and develop the relationships mathematically. Once gotten, these relationships may be translated into actions.

The key idea here is that effective motor sergeants need, and use, maintenance status information. Developing a simple manual system is feasible but needs further investigation for classroom definition.

1. Job Problems and Potential Solutions (1)

Two levels of analysis are appropriate for solving technical job problems. In the first, the **problem** and its causes are analyzed to generate a set of potential solutions. In the second, the potential **solutions** themselves are analyzed to identify those that are cost-effective. The curriculum should teach this two-stage approach to problem-solving. Although the differences between the two stages may be indistinguishable for simple problems, the discipline of the two-stage approach will help the motor sergeant solve difficult problems in a systematic way.

To gain knowledge of:

- Awareness of two-stage approach
- Testing acceptable solutions

The curriculum should show the motor sergeant how to establish criteria for acceptable solutions and how to test the solutions to determine whether the criteria are met. The concept of working to an acceptable solution should be covered; the motor sergeant need not exhaustively test all potential solutions, only enough of them to find an acceptable one (even though he may suspect that a better one could be found eventually). Exercises using typical job problems should be developed and administered, along with evaluation of performance.

2. Motor Sergeant's Required Duties (3)

The curriculum should contain a section to provide the motor sergeant trainee with skills in task analysis that could be applied to his own duties. While the list of pertinent tasks may change from day-to-day, practice in constructing lists on paper should be given to ensure that the trainee can do it properly. Criteria for prioritization of tasks for ultimate completion should be developed for the curriculum. Management literature on time management can be applied to help structure this topic. However, the conventional view of time management must be tailored to the unique

- To list all pertinent tasks
- To prioritize all pertinent tasks

MODULE 1: PROCESSING INFORMATION (Continued)

Action	Context	Objective
3. Current Unit Status (4)		
<p>The curriculum should provide a systematic method for the motor sergeant to review and analyze all of the information that he has about the unit--verbal reports and information from mechanics and operators; maintenance status documents from MPS(O) or TAMMS; orders and memos regarding mission readiness requirements; planned activity; and personnel records.</p> <p>While an experienced and talented motor sergeant might be able to accomplish the above mentally, it is unlikely that a new motor sergeant will be able to do it without a structured approach and some analytic tools. These tools--check lists, planning forms, guidelines for priorities, etc.--should be developed and integrated into a relatively compact structure that can be managed by the motor sergeant. Even if most motor sergeants abandon the structure in the unit it is an essential step for teaching a crucial set of concepts. Exercises using typical cases should be developed and administered; performance should be evaluated.</p>		
<p>The objectives are to:</p> <ul style="list-style-type: none"> • Identify job requirements • Identify skill levels of mechanics • Identify resource requirements • Identify available resources • Prioritize jobs • Match jobs to mechanics according to skill (and previous task experience) 		
4. Mechanics' Task Experiences (1)		
<p>One of the duties of the motor sergeant is to identify mechanics who need additional maintenance training. An easily obtainable measure of task proficiency is the number of times a mechanic has performed a given task. This can be used as an indicator of training needs for that mechanic. (For units with the MPS(O), printouts about task experiences will provide this information.) This simple method should be followed to plan on-the-job training. Its operation and implications should be covered briefly in the curriculum.</p>		
<p>Objectives are to:</p> <ul style="list-style-type: none"> • Establish, for each task, the average number of experiences per mechanic in the unit • Identify, for each task, those mechanics who are below the average in the unit 		

5. Roster (1)

As a first step in monitoring the whereabouts of mechanics, the motor sergeant must analyze the unit roster to determine each mechanic's weekly duty assignment and daily work status. This topic should be discussed briefly in the curriculum.

- To show the motor sergeant the need for monitoring his mechanics whereabouts for planning purposes

6. Forms, Records and Information They Should Contain (34)

Two levels of analysis are required for forms and records. First, the curriculum should provide details on the procedures for filling out those Army forms and records for which the motor sergeant is responsible. Examples of typical forms should be used in exercises. The trainee should learn what the forms require for correct completion. Second, because he will receive some forms partially completed by his mechanics, the motor sergeant trainee should know how to analyze the previously recorded information for errors or incompleteness. Exercises in completing partially completed forms and records should be developed for "hands-on" practice.

Objective is to:

- Determine the set of information that has to be filled in at his level.
- Determine accuracy of information
- Correct mistakes
- Derive, where possible, missing information from completed information on the form
- Obtain remaining information to complete the form or record

7. The Motor Sergeant's Attitude Toward His Mechanics (1)

The motor sergeant trainee must know how to analyze his attitudes toward each mechanic and to identify specific components of that attitude based on the mechanic's personality, individual job performance, and team performance.

To provide him with:

- Appreciation of personality variables
- Need for objective unbiased judgment
- Easier ways to assess performance

A check sheet or similar structured tool for breaking down the components of attitude should be developed and presented briefly in the curriculum. While it is unlikely that the motor sergeant will use this "tool" in the unit, it will demonstrate the feasibility of performing such an analysis. It will also provide him a set of concepts for providing feedback to his mechanics based on individual and team performance rather than on global, diffuse judgments that confound performance with personality. Ideally, exercises to develop this analytic skill would be based on pre-recorded video-tapes or movies of typical situations; the trainee would practice identifying his attitudes toward different characters in the pre-recorded situations.

MODULE 1: PROCESSING INFORMATION (Continued)

Action	Context	Objective
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NOTES ON IMPLEMENTING MODULE 1

The three actions--reads, translates, and analyzes--often occur in identical contexts. A parallel, track-type presentation of these actions is therefore more suitable than a sequential presentation. For example, presentation of all the contexts for reads, followed by all of the contexts for translates, would require repetition of many of the contexts. A better approach is to define the fundamentals of each action at the outset of the module, and to alternate among these actions as the curriculum works through the contexts.

A parallel track approach will also eliminate the sometimes artificial distinctions between actions. For example, note that the motor sergeant "analyzes the roster to identify each mechanic's daily work status"; but the action could as well have been reads or translates. The petty distinctions among these actions for this particular context will disappear if the actions are presented in the curriculum in parallel.

The following table shows how to sequence the curriculum for Module 1 in a parallel track for the actions, while maintaining a logical order of contexts. For ease of description we have categorized contexts in three ways: **technical**, **administrative**, and **psychological**. The numbers in the table represent the material presented under each of the numbered contexts, within each of the three actions.

RECOMMENDED SEQUENCING OF CONTEXTS FOR MODULE 1*

CATEGORY OF CONTEXTS	ACTION		
	Reads	Translates	Analyzes
• Technical	1-----▶ 1-----▶ 1		
• Administrative:			
Self			2
Unit	2	2, 3	3, 4, 5
Records			6
• Psychological			7

*Sequence: Begin in first row, left column; proceed across all columns before advancing to next row.

MODULE 2: SUPERVISING

This module covers three actions associated with the effectiveness of motor sergeants: He personally **manipulates** tools and equipment parts, **checks** jobs, and **keeps track** of work and people. Whereas Module 1 concerned actions that allowed the motor sergeant to understand, organize, and initiate technical work, Module 2 concerns actions that allow him to maintain productivity and quality in technical work. Skill in executing the actions described in Module 2 should be considered a necessary adjunct to the basic skills described in Module 1.

Action	Context	Objective
A. MANIPULATES	Tools and Parts (3)	
	<p>The results of the survey to identify characteristics of an effective motor sergeant showed that he does not have to spend a large amount of his time actually performing maintenance tasks. But the survey indicated that he must have ability to perform "hands-on" maintenance to demonstrate new tasks, to evaluate work, and to troubleshoot effectively. A curriculum of this type can't teach the motor sergeant trainee the details of how to manipulate tools and parts; this is technical knowledge and skill that the motor sergeant must already have to some degree. He can, however, improve his skill through self-study or attendance at 20-, or 30-level courses.</p> <p>However, the curriculum can, and should, teach the trainee when and how to use this skill and knowledge to demonstrate new tasks to low-skill mechanics and to evaluate their work. The curriculum should cover the methodology of demonstrating new maintenance tasks and show appropriate maintenance steps in their correct sequence. It should also cover methods of checking, evaluating and testing finished work with particular emphasis on reportable items.</p>	<ul style="list-style-type: none"> • To assess tool handling skills of trainees • To review troubleshooting and evaluation procedures • To provide knowledge of demonstrating new maintenance procedures

Although we have noted that this curriculum is not appropriate for teaching the details of "hands-on" skill and knowledge, consideration must be given to testing trainees for some minimum level of performance, because the ability to troubleshoot via tool handling or test-equipment manipulation is an important characteristic. If the motor sergeant can't troubleshoot effectively, he can't maintain quality control of the output of his mechanics or help them through difficult maintenance problems.

MODULE 2: SUPERVISING (Continued)

Action	Context	Objective
B. CHECKS		
Checking is another action closely related to quality control. Unlike personally manipulating tools and parts, checking involves observation. This part of the curriculum will introduce the motor sergeant trainee to basic concepts in quality control and inspection. It must show him how he is the final arbiter of quality and also how he can use feedback to his mechanics to improve the quality of their work before it reaches him, which will eventually make his checking job easier.	<p>1. Mechanics Performing Maintenance (1)</p> <p>The curriculum should help the motor sergeant develop a method for checking mechanics as standard practice while they are performing maintenance. It is important that the motor sergeant trainee realizes he must ignore unimportant or arbitrary differences between his and a mechanic's method of performing non-critical steps. He should focus on critical steps, should judge the adequacy of the mechanic's performance on these steps, and should provide feedback to the mechanic. The curriculum should set up realistic exercises for practicing these skills. Use of pre-recorded scenarios would standardize the exercises.</p>	Objectives are to: <ul style="list-style-type: none"> • Discriminate among critical steps • Evaluate performance of critical steps
	<p>2. Completed Jobs (1)</p> <p>The curriculum should also help the trainee develop the habit of checking completed jobs for indicators of mission-ready versus faulty equipment. He should examine the equipment for visual, auditory, tactile, and olfactory clues to its status. Ideally, curriculum developers should construct a checklist of clues for each type of equipment regularly serviced by company mechanics. While such a list cannot substitute for the personal skill and knowledge required of each motor sergeant, it would serve as a reminder of the things to look for, as well as a checklist for a personal study program for him to increase his knowledge.</p>	<ul style="list-style-type: none"> • To use, and develop if necessary, a checklist for inspecting each equipment item
C. TRACKS		
Keeping track of things means to continuously maintain knowledge of a dynamic process. It may involve the use of	<p>1. Unit Status (1)</p> <p>Keeping track of unit status could be presented in the curriculum simply as conducting an analysis of unit status (see Module 1) at regular, relatively short intervals. However, whether or not this could be managed by the motor sergeant depends on how complex the ultimate</p>	Goals are to: <ul style="list-style-type: none"> • Emphasize importance of tracking unit status • Explore possibility of using a special "game" to teach status

status boards, or may be done from memory. This action is usually difficult or impossible for middle managers to execute reliably, because of the distracting environments in which they work and because they are under considerable time pressure.

system is for analyzing unit status; if it is too complex, he will have neither time nor inclination to operate the system. Another alternative is for the curriculum to contain instruction on use of a simple status board to assist the motor sergeant in keeping track of the key elements of unit status.

The goal of this part of the curriculum is to make the motor sergeant aware of the need to keep track of unit status--particularly those aspects of status affected by supply. Long delays in resource acquisition are unacceptable.

Keeping track of unit status is a difficult skill to acquire and maintain, especially in an environment like the motor pool. However, it may be taught effectively via a simulation game, where the students in the class would create an appropriate, distracting environment while one student tracks the changing pattern of a criterion variable. Objective measures should be developed to score "tracking" accuracy; ideally these measures would also reveal the reasons for certain kinds of errors and lead to prescriptions for remedial practice. (The USAOC&S has already developed a similar resource allocation game for DS units.)

2. Mechanic's Whereabouts (1)

Keeping track of the whereabouts of each mechanic is important for planning for maximum productivity. The curriculum must emphasize this aspect of personal accounting. Some type of personnel status board might be recommended that would help the motor sergeant keep track of each mechanic's weekly duty status and daily work status.

3. Mechanic's Task Experiences (3)

The curriculum should make the motor sergeant realize the need for keeping track of mechanics' task experiences.

- Purpose is to:
- Allot tasks equally among mechanics

- To identify recurring errors and provide remedial measures.

- To ensure awareness of importance of personnel accounting

MODULE 2: SUPERVISING (Continued)

Action	Context	Objective
<p>3. Mechanic's task experiences (Continued)</p> <p>As discussed earlier, the number of experiences that a mechanic has had on a given task can be related to performance skill. When keeping track of task experiences to determine training needs, the motor sergeant must identify those tasks that are new to individual mechanics and those that are new to the unit. (If the unit has MPS(O), tracking task experiences is simple.) If the unit does not have MPS(O), a task-by-mechanic tally sheet for each equipment item must be used.</p>		
		<ul style="list-style-type: none"> ● Identify mechanics who need maintenance training on specific tasks

NOTES ON IMPLEMENTING MODULE 2

This module can be handled as a simple sequence of three actions, **manipulates, checks, and keeps track**. The discussion of actions and contexts in this module has been organized into the same ordering of categories of contexts (**technical first, administrative second**) that was suggested for the parallel track presentation in Module 1. There is no need in this module to alternate among the actions.

MODULE 3: COMMUNICATING

This module covers two actions, **talks** and **solicits**, that influence strongly the motor sergeant's effectiveness in executing the actions described in Modules 1 and 2. Poor communications skills and actions will dilute or nullify other skills he may have acquired.

Action	Context	Objective
A. TALKS		
<p>This action includes talking to, which implies giving direction to someone, and talking with, which implies a two-way dialogue. It is important that the curriculum reflects the large range of differences in people's innate ability to communicate. Ideally, good communication skills (primarily talking) should be a primary selection criterion for prospective motor sergeants.</p>	<p>1. Technical Experts (8)</p> <p>The motor sergeant should be encouraged to talk regularly with technical experts, which may include other motor sergeants and particularly skilled or knowledgeable mechanics or officers.</p> <p>The purpose is to receive and exchange technical information. The objective of this part of the curriculum is to make motor sergeants aware of the availability of technical information by simply asking an expert (see Context 2 following regarding the process of identifying experts). Motor sergeants should be encouraged to make use of all sources of technical assistance. This skill could be taught in "game" scenarios with appropriate tests to determine the amount of information received.</p>	<p>Objective is to obtain information about:</p> <ul style="list-style-type: none"> • Troubleshooting and diagnosis • Maintenance actions (preventive and corrective) • Tools, parts, and equipment • Documents and regulations • Undocumented modifications • Alternative supply sources • Special tools and test equipment
	<p>2. Co-Workers (5)</p> <p>The motor sergeant must acquire information he needs from co-workers, and disseminate information to them on appropriate topics. This type of communication is fundamental to the motor sergeants' control over team productivity.</p>	<p>To gain and disseminate information on:</p> <ul style="list-style-type: none"> • Identify job requirements • Identify resource requirements • Identify available resources • Verify mechanic's weekly duty assignments and daily work status • Establish job responsibilities • Establish job schedules • Establish supervisory roles

MODULE 3: COMMUNICATING (Continued)

Action	Context	Objective
	<p>2. Co-workers (5) (Continued)</p> <p>The other aspect of talking to co-workers is more subtle and involves the motor sergeant and co-worker in establishing team rapport (i.e., as members of a social network) and encouraging face-to-face dialogues with his peers and co-workers.</p> <p>Establishing team support is also essential to productivity since it touches on motivation, understanding of individual differences, unique personnel characteristics, and other complex aspects of human behavior besides the technical skills basic to good performance.</p> <p>Simulation gaming is widely used for this type of training. It would require development of scenarios, role playing, and a method of evaluating results.</p>	<p>Objectives are to identify and understand:</p> <ul style="list-style-type: none"> • Social relationships among co-workers • Sources of information on personnel interactions • His own relationship with co-workers
	<p>3. Mechanics (4)</p> <p>The purpose of this activity is to disseminate technical information that the motor sergeant has acquired from reading, personal experience, and talking with technical experts. It is important that he understands advisory "style" has a significant impact on how well advice given is used. The curriculum must therefore emphasize and illustrate potential problems in giving technical advice. Group simulation gaming would be particularly effective here.</p> <p>The motor sergeant must define his performance goals clearly to his mechanics. (This requirement was partly covered in another context.) But the emphasis here is that the motor sergeant must ensure each mechanic understands what he is expected to accomplish. This may include a requirement for a mechanic to improve his skill for repair-</p>	<p>To advise mechanics on maintenance procedures involving:</p> <ul style="list-style-type: none"> • Troubleshooting and diagnosis • Maintenance actions • Tools, parts, and equipment • Documents and regulations • Undocumented modifications <p>To communicate performance goals to mechanics</p>

3. Mechanics (4) (Continued)

ing a particular type of equipment. How far mechanics should go in solving interpersonal conflicts or increasing team productivity must also be made clear by the motor sergeant. Group simulation gaming would provide an effective medium for instruction for this subject.

When talking with his mechanics, it is important that the motor sergeant establish a non-restrictive atmosphere. The purpose is to allow mechanics to show initiative, but the motor sergeant must first set the scene by informing mechanics they are expected to use initiative, within legal and technical limits, to get the job done.

Another important objective for talking with mechanics is so the motor sergeant can identify and publicize effective rewards for mechanics who have demonstrated superior performance. This topic is addressed in subsequent paragraphs.

- To inform mechanics' that initiative in accomplishing work is encouraged.

B. SOLICITS

Solicits is a form of talks, whereby the person "soliciting" is requesting information or material.

1. Guidance from mechanics (1)

One characteristic of an effective motor sergeant is his willingness to listen to technical suggestions from mechanics, which can best be achieved if the motor sergeant specifically requests information on topics including: maintenance procedures, job scheduling, and resource management. The curriculum must include a topic whereby the motor sergeant becomes practiced in this communication skill. The unit's productivity will probably increase, not only because of specific problem-solving suggestions on technical matters, but also because of mechanics' increased contributions to decision-making concerning maintenance problems at the unit level.

- To incorporate mechanics in the decision-making process.

MODULE 3: COMMUNICATING (Continued)

Action	Context	Objective
	<p>2. Assistance from social network (1)</p> <p>When a motor sergeant is well-established in an informal social network of his co-workers in other units, he can obtain needed resources (labor, tools, parts, documents, etc.) from alternative sources. The curriculum must emphasize the importance of establishing rapport with colleagues and peers in other units so he may seek assistance in emergencies. This topic should be included for those trainees who may find difficulty in establishing such relationships.</p>	<ul style="list-style-type: none"> ● To build personal contacts in a mutual assistance network
	<p>3. Feedback from mechanics (1)</p> <p>One characteristic of an effective motor sergeant is for him to encourage his men to provide constructive feedback. This feedback should be related to factors affecting work performance such as lack of tools, documents, friction between mechanics, promotion appropriateness, and the like.</p> <p>The motor sergeant needs to learn the skill of controlling these interactions to avoid lengthy discussions on problems insoluble at his level.</p>	<ul style="list-style-type: none"> ● To achieve skill in encouraging open discussion with mechanics under a controlled format.

NOTES ON IMPLEMENTING MODULE 3

This module can be handled as a simple sequence of the two actions and their contexts in the same order as presented above. This order is, generally, technical categories first, administrative second, psychological third.

MODULE 4: ENHANCING PERSONAL EFFECTIVENESS

This module covers two actions related to the motor sergeant's personal effectiveness. They require skills that are difficult to learn in a short curriculum, but should, as a minimum, be included in descriptive lecture form. The motor sergeant trainee will thus be introduced to an area of personal growth that may be enhanced through independent study.

Action	Context	Objective
A. MAINTAINS CONTROL		
1. Under stress (2)	<p>Two characteristics of effective motor sergeants-- reacts to crisis effectively, and works effectively under time pressure--require that the motor sergeant can operate under stress to:</p> <ul style="list-style-type: none"> • Direct mechanics' activities • Achieve the unit's performance objectives <p>Maintaining control under stress is, of course, an innate personal characteristic that is difficult to train in any course that might be developed for motor sergeants. We believe, however, that directing the mechanics' activities to priority tasks, and achieving the unit's performance objectives can be used as a practical base for teaching operating strategies when conditions are particularly stressful. Since the armor battalion environment is stressful and distracting to effective motor sergeant performance, simulation of those conditions is feasible in a carefully orchestrated scenario containing test and evaluation components.</p>	<p>To make motor sergeants aware of:</p> <ul style="list-style-type: none"> • Components of stress • Strategies for dealing with stress under operational conditions
B. FOCUSES		
1. Attention (2)	<p>Closely related to maintaining control under stress is the skill of focusing and maintaining attention on high priority tasks. While maintaining control refers more to the motor sergeant's ability to program his workforce to achieve the unit's performance objectives, focusing attention refers more to the motor sergeant's ability to work in a tightly focused, goal-directed fashion on tasks which have high priority. This means he must not be distracted by other events, must have good powers of concentration, must have ability to make value judgments, and must maintain his efforts until the job is complete.</p>	<ul style="list-style-type: none"> • To gain the ability to make priority assessments and execute appropriate actions until the priorities have been cleared.

NOTES ON IMPLEMENTING MODULE 4

This module can be presented in the same sequence of topics as presented above. All topics are a mixture of administrative and psychological concerns.

MODULE 5: ENHANCING THE WORK ENVIRONMENT

This module covers two actions that the motor sergeant should perform to "fine-tune" the work environment.

Action	Context	Objective
A. REWARDS	1. Mechanics (3) <p>To motivate mechanics, the motor sergeant should reward them for exceptional performance on individual jobs, self-initiated problem-solving actions, and team tasks. The motor sergeant will have learned from mechanics things that mechanics perceive as rewards. Examples include, oral commendations, time off work, leave passes, and, recommendations for promotion. The curriculum should instruct the motor sergeant on how to use these rewards to enhance mechanic's performance. The topic must include methods of developing criteria for performance, (time, work quality, neatness, etc.) impartiality of application, mechanics awareness of the program, and methods of evaluating effect.</p>	<ul style="list-style-type: none"> ● To improve mechanic performance via reward
	B. ASSERTS <p>The curriculum should provide some guidelines to prospective motor sergeants on the complex behavioral quality of being firm when direction or decision is required, without appearing dictatorial, autocratic or unfeeling.</p>	<ul style="list-style-type: none"> ● To provide the prospective motor sergeant with an opportunity to structure his directive actions.
	1. Co-workers (1) <p>This topic should be included to make the motor sergeant aware that his decisions and plans must have a logical basis before he attempts to implement them. He may have to provide a basis for his decisions and subsequent actions in some future accounting. The simulation of this process in a work environment is feasible and should be explored.</p>	

2. Superiors (1)

An important characteristic of an effective motor sergeant is his ability (at least in mechanic's eyes) to back them in a confrontation with higher authority. (This assumes, of course, that the mechanics actions under discussion were correct.) The curriculum therefore should contain material to show the motor sergeant how best to assemble information to explain and justify the actions of his mechanics to his superiors. It should provide practice in describing to superiors the basis for a mechanic's job performance and personal actions. Simulation exercises and role-playing are the best media for indoctrinating the motor sergeant in this topic.

- To demonstrate methods to best provide support for mechanics in work-related confrontations.

NOTES ON IMPLEMENTING MODULE 5

This module can be presented in the same sequence of topics as presented above.

NOTES ON EVALUATION AND RESOURCES IN CURRICULUM DEVELOPMENT

In this curriculum and in all curriculum specifications, positive evaluation results of an individual imply that a student has met the training criterion and can advance, or that he requires additional training to meet the criterion, or that he is unsuitable and should be returned to his previous duty status. The degree to which this specification, when embodied in a curriculum, will produce effective motor sergeants will be determined largely by the type of evaluation used, and resources allotted to developing a detailed curriculum and conducting training. If resources are not available to develop and administer the training, or the evaluation is not rigorous, the expected gains in the effectiveness of motor sergeants will not be achieved Army-wide.

NOTES ON BEHAVIORAL COMPONENTS DESCRIBED IN THE MODULES

Some topics described in the modules concern complex components of behavior rather than well-defined technical skills and knowledges. These topics generally focus on personal interactions with others or on intangibles such as the degree of firmness he should exercise when giving directions. In many cases these could, and do, form subjects for many semesters of university-level instruction. We suggest, in the module descriptions, that the motor sergeant be taught awareness of these topics. This means that we believe it would be costly to develop a training regimen to systematically alter or train a trainee's behavioral style. However, we also believe that the topic should be described in the curriculum and that some opportunity be provided for him to become acquainted with these behavioral components in a controlled but practical setting.

ACTIONS REQUIRED TO IMPLEMENT THE CURRICULUM SPECIFICATION

The three types of action required to transform the results of the research reported here into a training package for implementation are described below.

First, cognizant training authorities in the Army must determine the resources that should be allocated to developing and administering motor sergeant training. This decision will require consideration of the potential benefits of raising motor sergeant skill levels; logistics problems in transporting motor sergeant trainees to training sites or, conversely, supplying decentralized training packages to armor battalion sites; costs in supplying instructors, media, and material throughout the life cycle of the training program; and costs in the initial development of the training program. These considerations are heavily interactive and require a sophisticated tradeoff analysis. But before such an analysis could be done, Army policy-makers would have to agree on an appropriate weighting of tradeoff criteria such as initial development costs, administrative labor costs for logistics, policy toward centralized versus decentralized training, etc.

Second, a prototype training program must be developed. The system blueprint for it is contained in this report, but details of lesson plans, media, and materials will depend on the constraints imposed as a result of the actions described in the previous paragraph. In developing the detailed curriculum, existing training resources should be used. Appendix C contains a listing of titles of a large sample of these resources. Additional resources are available in the training literature on middle-level business management, which presents job situations similar to those of the motor sergeant. Other resources are available from the behavioral and general training literatures. All of these resources will have to be tailored to the particular topics and constraints of the motor sergeant training program.

Third, the prototype training program will have to be implemented and evaluated under whatever conditions will obtain for the final program. Typical trainees and instructors must be used. Evaluation should include pre- and post-tests of motor sergeant effectiveness, which will first have to be developed for evaluation of the prototype, but which may be used in later training courses as part of normal course quality control. The results of the evaluation of the prototype training course will be used to modify the program before releasing the final package for Army-wide use.

APPENDIX A

Details of the Survey Methodology and Analysis of Results

SURVEY DEVELOPMENT

Item Construction

Practical considerations imposed three constraints on the structure of the instrument. First, the survey instrument was limited to 100 items to ensure that interviews would be conducted in less than one hour since the survey was conducted on a "not-to-interfere" basis. Second, items were written as short sentences so the context could be understood easily and read aloud by the interviewer if required. Third, unusual words and jargon were avoided so that maintenance personnel with limited education and vocabulary could participate in the survey.

The survey instrument was constructed in five stages:

1. Four ASI senior scientists independently drafted an initial pool of over 250 questions. Item content was guided by first-hand experience with Army maintenance problems and knowledge of the research literature on job satisfaction and supervisor effectiveness. Item content was also guided by the results of a detailed task analysis, which had been conducted previously to determine the components of a motor sergeant's job.
2. Two senior scientists jointly reviewed each item from the pool. Items that had redundant content or tapped characteristics unrelated to maintenance were eliminated.
3. The remaining items were rewritten to have the same tense and style. A common beginning phrase, "How important is . . .," was used to provide an identical context for each item.
4. Items were categorized into one of the nine job dimensions indicated in Figure 1. These dimensions covered the major domains of supervisor activity typically cited in studies of supervisor effectiveness.
5. Some items were rewritten to conform more closely to their assigned job dimension. Items only marginally related to a job dimension were eliminated. The final set of 100 items was then derived to ensure that a substantial number of items comprised each job dimension.

The instrument itself was produced by randomly assigning items within each dimension to one of the 100 positions. A 10-point rating scale was printed at the top of each page of the questionnaire. A cover page identifying Anacapa Sciences, Inc. (ASI) and explaining the purpose of the study was attached. The survey instrument and answer sheet are reprinted in Appendix B.

SURVEY ADMINISTRATION

A total of 105 organizational maintenance personnel were interviewed at Fort Stewart, Georgia and Fort Carson, Colorado. Interviews were conducted at Fort Stewart between 31 May and 4 June 1982. Interviews were conducted at Fort Carson between 30 August and 3 September 1982. Personnel were drawn from several armor battalions at each site. Three levels of personnel were represented in the survey: mechanics, motor sergeants, and motor officers.

Respondents were selected in advance and scheduled for interview jointly by Anacapa staff and battalion personnel. Interviews were conducted under similar conditions at both sites: Each respondent was interviewed by an ASI senior scientist. After introductions, respondents were briefed on the purpose of the survey. The confidentiality of their answers was assured; the only personal information that was recorded was the respondent's rank and years in service.

The respondent was given a copy of the instrument and asked to read along silently as the interviewer read each question aloud. For each item the respondent was asked to rate how important that characteristic was in determining the effectiveness of a hypothetical motor sergeant, rather than one he might know. Ratings were assigned on a 10-point scale, with 10 corresponding to maximum importance and 1 corresponding to minimum or no importance. The interviewer recorded the respondent's verbal response on a separate rating sheet; the respondent had nothing to write.

Questions were read slowly to ensure that the respondent understood their meaning. If the subject did not understand a word or phrase, the interviewer either repeated the question or substituted a synonym for the original word. Interviews required 45-60 minutes to complete.

Answer sheets were returned to ASI's Santa Barbara office, where the data were coded, keypunched, and stored on an NASCO AS/6 computer at the University of California, Santa Barbara. The data were subsequently processed using the Statistical Analysis System.²

²Helwig, J. T., & Council, K. A. **SAS user's guide, 1979 edition.** Cary, North Carolina: SAS Institute, Inc., 1979

SURVEY RESULTS

Most of the items were rated as highly important by a majority of the respondents, which produced a markedly skewed distribution of item ratings. The average rating, based on all items and respondents, was 8.26. Table 8 gives the mean rating for each item, calculated separately for the six combinations of respondent level and survey site.

Reliability

The psychometric reliability of the instrument was assessed in two ways. First, the nine job dimensions were treated as test subscales and the internal consistency of respondent's ratings within each subscale was examined. Second, the consistency of ratings across the three levels of respondents was measured.

The internal consistency of ratings assigned to items within each subscale was measured by the Cronbach alpha composite reliability coefficient.³ Subscale coefficients were calculated individually for each subgroup and for all subgroups combined. The coefficients yielded by this latter method of analysis were somewhat lower because of variation in ratings among the three levels of respondents.

As a compromise between the two methods mentioned above, subscale composite reliability coefficients were computed for each of the three respondent levels, and an average of the three values taken. These average reliability coefficients are presented in Table 9. Although the coefficients are somewhat lower than those typically reported in psychometric work, it should be recalled that these subscales were formed prior to data collection, while typical psychometric evaluations construct subscales after extensive data analysis.⁴ Viewed in this context, the coefficients for several of the subscales were surprisingly large. In particular, the liaison, technical knowledge, and training/learning subscales yielded composite coefficients that exceeded .60 at both sites. Composite coefficient values for the other subscales were generally in the .35-.55 range, except for an extremely low value for the work habits subscale at Fort Carson.

³Guilford, J. P. **Psychometric methods**. New York: McGraw-Hill, 1954.

⁴Harris, R. J. **A primer of multivariate statistics**. New York: Academic Press, 1975.

TABLE 8
MEAN RATINGS FOR THE 100 SURVEY ITEMS
 (Maximum Possible = 10)

Survey Item Number	Mean Rating Data					
	Fort Carson			Fort Stewart		
	(N=14) ¹ Officer	(N=16) Sergeant	(N=29) Mechanic	(N=10) Officer	(N=11) Sergeant	(N=25) Mechanic
1	9.57	9.06	9.10	9.10	9.00	8.84
2	9.29	9.31	9.07	9.30	8.27	8.40
3	8.14	7.69	8.00	6.40	8.18	7.24
4	9.00	9.75	9.79	9.10	9.27	9.32
5	6.43	5.44	4.62	2.80	2.36	3.16
6	5.14	6.81	7.62	6.20	8.18	7.96
7	3.29	2.75	3.97	4.90	4.09	4.12
8	9.00	8.81	8.83	8.50	7.73	7.48
9	8.54	9.06	7.93	6.30	7.82	8.24
10	7.43	7.13	6.83	7.80	6.82	6.52
11	6.71	7.25	5.31	7.60	6.91	4.96
12	8.57	9.06	8.38	7.80	7.82	8.60
13	5.86	6.50	6.93	6.70	5.00	5.20
14	9.79	9.69	9.55	9.40	8.91	9.16
15	9.79	9.13	9.07	9.00	9.27	8.32
16	7.14	7.75	7.59	7.30	7.91	6.60
17	8.43	8.56	8.83	8.60	8.91	9.28
18	9.36	9.69	9.28	8.80	9.45	8.88
19	9.71	9.81	9.24	9.30	8.82	9.28
20	7.07	8.38	8.28	6.50	6.64	8.32
21	8.64	9.00	9.41	8.70	8.82	7.32
22	8.64	9.25	9.38	8.50	9.00	8.88
23	7.07	5.63	7.00	7.80	6.45	5.96
24	9.71	9.00	9.07	8.90	8.82	8.72
25	9.29	9.38	8.90	8.80	8.55	7.96
26	7.71	8.50	8.21	7.50	8.09	6.64
27	7.71	6.75	8.00	8.00	7.00	7.40
28	8.50	8.94	9.17	8.70	8.91	8.00
29	8.86	9.00	8.83	7.90	8.00	8.04
30	8.21	8.81	9.07	8.00	8.27	8.36
31	8.36	9.13	8.93	8.91	9.09	8.92
32	3.50	3.69	1.93	2.70	2.82	2.84
33	8.50	9.31	9.55	8.70	8.36	8.88
34	8.71	8.63	7.93	7.80	7.73	6.04
35	7.21	7.38	7.69	7.10	8.27	7.04
36	8.79	9.31	9.28	9.40	8.73	8.32
37	9.21	9.44	9.55	9.50	8.45	8.48
38	4.57	5.75	6.10	6.70	5.55	6.04

¹ Number of personnel tested is indicated in parentheses.

TABLE 8 (Continued)

Survey Item Number	Mean Rating Data					
	Fort Carson			Fort Stewart		
	(N=14) Officer	(N=16) Sergeant	(N=29) Mechanic	(N=10) Officer	(N=11) Sergeant	(N=25) Mechanic
39	6.36	7.63	7.21	8.60	7.64	6.76
40	9.07	9.00	8.83	8.80	8.45	7.88
41	9.14	9.06	9.72	7.50	8.09	8.92
42	9.71	9.13	9.24	9.20	8.73	8.48
43	8.79	9.25	9.45	8.40	8.64	9.12
44	9.43	9.75	9.72	9.30	8.55	8.00
45	8.57	9.00	9.03	7.70	8.09	7.88
46	8.00	8.69	8.28	8.90	8.64	7.96
47	9.29	9.06	9.24	9.20	8.91	8.12
48	8.36	8.69	8.93	8.80	8.55	8.04
49	9.64	9.50	9.55	9.00	8.45	8.60
50	6.86	6.63	8.10	7.90	6.64	6.96
51	9.21	8.69	9.21	8.90	9.09	8.80
52	8.79	8.63	8.21	7.90	8.82	8.88
53	9.50	9.13	9.45	8.80	9.27	7.96
54	7.71	6.94	6.76	8.80	6.73	5.92
55	8.50	9.19	9.59	8.60	8.27	9.04
56	9.29	9.19	8.31	9.20	8.45	6.96
57	8.79	8.44	8.76	7.70	7.91	7.36
58	9.64	9.00	9.17	8.90	7.64	7.92
59	8.43	8.56	8.07	7.80	8.64	8.60
60	5.50	6.44	5.59	7.80	7.00	7.24
61	8.93	8.50	8.83	8.80	8.64	6.96
62	9.21	9.19	8.79	8.70	8.64	8.00
63	9.57	9.38	9.48	9.20	8.73	9.08
64	9.50	9.00	9.76	9.50	8.82	8.88
65	8.64	8.94	8.83	9.40	8.64	8.36
66	8.64	8.94	9.38	8.70	8.36	8.68
67	9.07	8.38	8.03	8.70	8.73	5.72
68	9.64	9.50	9.90	9.20	9.00	8.80
69	9.07	9.38	9.72	7.70	8.45	8.68
70	8.00	9.19	9.14	7.80	9.09	9.40
71	9.50	9.38	9.55	8.90	8.73	8.48
72	8.79	9.44	9.79	8.40	8.09	9.16
73	9.00	9.06	8.72	8.70	8.36	8.52
74	8.71	7.94	8.69	9.30	8.82	8.04
75	9.29	8.88	8.59	9.70	9.09	7.88
76	9.57	9.44	9.38	9.60	9.09	8.64
77	9.07	8.38	8.90	8.70	7.91	7.68
78	9.50	9.63	9.93	9.00	9.18	9.08
79	8.00	8.63	8.07	8.40	8.73	7.96

TABLE 8 (Continued)

Survey Item Number	Mean Rating Data					
	Fort Carson			Fort Stewart		
	(N=14) Officer	(N=16) Sergeant	(N=29) Mechanic	(N=10) Officer	(N=11) Sergeant	(N=25) Mechanic
80	9.14	9.31	8.38	8.50	8.73	8.60
81	7.93	7.94	6.52	7.20	8.36	7.56
82	8.00	8.38	8.38	7.70	8.82	8.32
83	8.64	9.19	9.21	8.60	8.18	8.20
84	8.36	8.06	7.24	8.70	8.55	7.24
85	8.36	6.50	8.31	7.30	5.82	7.60
86	7.00	8.00	6.93	7.60	7.82	7.60
87	8.86	8.88	8.97	8.50	8.18	7.72
88	9.43	9.44	8.97	9.30	8.45	8.40
89	9.50	9.06	8.55	8.10	8.55	7.12
90	9.14	8.94	8.69	8.40	9.00	7.48
91	9.29	9.13	9.21	7.70	8.09	7.40
92	9.64	9.69	9.45	9.40	9.09	8.64
93	9.29	9.13	7.90	8.60	9.00	7.56
94	8.00	7.69	7.41	4.50	5.55	5.24
95	9.21	8.50	9.28	8.60	8.09	8.12
96	9.64	9.06	8.97	9.40	8.64	7.68
97	6.14	5.25	5.72	5.60	3.82	4.60
98	7.43	7.06	7.14	7.60	8.55	6.04
99	9.14	8.94	9.10	8.70	8.64	8.00
100	7.43	6.13	7.66	6.80	7.18	7.60

TABLE 9
AVERAGE COMPOSITE RELIABILITY COEFFICIENTS
FOR THE NINE SUBSCALES¹ AT THE TWO SURVEY SITES

Subscale	SURVEY SITE	
	Ft. Stewart	Ft. Carson
Planning	.38	.34
Managing	.53	.48
Scheduling	.54	.58
Liaison	.72	.64
Training/Learning	.78	.80
Technical Knowledge	.74	.75
Technical Skills	.44	.39
Personal Qualities	.48	.37
Work Habits	.44	.17

¹ As measured by Cronbach's composite alpha coefficient, averaged across the three levels of respondents.

The consistency of item ratings across the three levels of respondents was assessed by nonparametric statistical analysis. For each level of respondent, items within a subscale were ranked according to their mean rating. For each pairwise combination of respondent type (e.g., mechanic-motor officer), Spearman correlations were computed on the item rankings. Spearman coefficients were obtained for each subscale at the two sites. Rates of overall agreement among the three sets of respondent comparisons are summarized by Kendall's coefficient of concordance.⁵ Kendall coefficients for the nine subscales are given in Table 10.

In general, the large values of the coefficients indicated that ratings were assigned consistently across the three levels of respondents. For the Fort Stewart data, the lowest average correlation was .63 for *liaison*, and the highest was .95 for *training/learning*. Coefficients were lower for the Fort Carson data, ranging from .49 for *liaison* to .87 for *managing*. But given the few respondents represented in each comparison and the underlying skew in the rating distributions, the sizes of the coefficients are impressive.

TABLE 10
AVERAGE RANK-ORDER CORRELATION BETWEEN
LEVELS OF RESPONDENTS¹

Subscale	SURVEY SITE	
	Ft. Stewart	Ft. Carson
Planning	.89	.77
Managing	.90	.87
Scheduling	.83	.62
Liaison	.63	.49
Training/Learning	.95	.58
Technical Knowledge	.66	.63
Technical Skills	.87	.73
Personal Qualities	.75	.62
Work Habits	.94	.62

¹ As measured by Kendall's coefficient of concordance.

⁵ Siegel, S. *Nonparametric statistics*. New York: McGraw-Hill, 1956.

Data Pooling

The feasibility of combining data across respondents levels and survey sites to produce a larger total sample was examined. Besides providing a larger sample for statistical analysis, pooling data for all respondents simplifies the identification of the most highly rated survey items. However, such data pooling is only appropriate if rating differences among respondents and sites do not vary across subscales.

This assumption was tested by performing an analysis of variance as follows: A mean rating based on all items in a subscale was computed for each respondent, and entered as the basic unit of analysis. Each respondent thus contributed nine scores to the analysis, one for each subscale. A 2 x 3 x (9) "repeated measures" analysis of variance design was used,⁶ representing two levels of survey site, three levels of respondent rank, and nine levels of subscale. Since different numbers of respondents appeared in the site and rank factors, the design was "unbalanced" and required a nonstandard analytic method. The general linear model routine in the Statistical Analysis Systems⁷ package was therefore applied, using the significance testing procedures recommended by Freund and Littell.⁸ The results of the analysis are given in Table 11.

Data pooling is justified to the extent that the effects of the site by subscale, rank by subscale, and site by rank by subscale interactions are small. Two aspects of the summary table support this interpretation. First, none of these terms reached the .001 level of statistical significance; a stringent significance criterion was applied in this case because of the large number of degrees of freedom in the error term (792). Second, none of these terms explained an appreciable portion of the variance in the data, as reflected by the low values of

⁶Winer, B. J. **Statistical principles in experimental design**. New York: McGraw-Hill, 1971.

⁷Helwig, J. T., & Council, K. A. **SAS user's guide, 1979 edition**. Cary, North Carolina: SAS Institute, Inc., 1979.

⁸Freund, R. J., & Littell, R. C. **SAS for linear models: A guide to the ANOVA and GLM procedures**. Cary, North Carolina: SAS Institute, Inc., 1981.

TABLE 11
UNBALANCED ANALYSIS OF VARIANCE SUMMARY TABLE

Source	df	SS	MS	F	ω^2
Between Subjects	104				
Site(S)	1	47.48	47.48	15.77*	.06
Respondent Rank (R)	2	7.24	3.62	1.20	.002
SxR	2	11.10	5.55	1.84	.006
Subjects within Groups	99	298.39	3.01		
Within Subjects	800				
Subscale (C)	8	146.27	18.28	73.12*	.19
SxC	8	4.13	.52	2.08	.003
RxC	16	11.64	.73	2.92	.01
SxRxC	16	3.57	.22	.88	0
C x Subjects within Groups	792	198.26	.25		
Total	944				

* $p < .001$.

ω^2 shown in the right-hand column of Table 11.⁹ Given these results, the individual items within a subscale may be examined separately to identify those items receiving the highest ratings.

Note that the two statistically significant factors, subscale and site, do not pose problems for data pooling. The significant main effect of subscale merely indicates that the mean ratings were not equal across subscales. In particular, the technical knowledge subscale was rated significantly higher than the work habits subscale, with the means for the other seven subscales falling in between. On the other hand, the significance of the site factor reflects the higher ratings assigned by Fort Carson respondents.

⁹ Hays, W. L. *Statistics for the social sciences*. New York: Holt, Rinehart, and Winston, Inc., 1973.

Determining the Most Highly Rated Items

Using the data from all 105 respondents, the mean rating for each item was calculated. These means appear in ranked order in Table 12.

The following method was used to identify the most highly rated survey items: First, the overall mean of all 100 items for all respondents, 8.26, was derived. Next, the average standard deviation in item ratings, 2.05, was derived. Next, the average standard error about the mean, .20, was calculated. Then, the

TABLE 12
SURVEY ITEMS RANKED BY MEAN RATING,
BASED ON ALL RESPONDENTS (N=105)

Ranking 1-25		Ranking 26-50		Ranking 51-75		Ranking 76-100	
Item Number	Mean Rating	Item Number	Mean Rating	Item Number	Mean Rating	Item Number	Mean Rating
78	9.46	41	8.97	48	8.55	3	7.66
4	9.45	53	8.97	87	8.51	34	7.66
14	9.43	36	8.94	91	8.51	27	7.52
68	9.38	88	8.94	90	8.50	85	7.51
19	9.36	70	8.92	29	8.50	35	7.43
63	9.28	2	8.91	74	8.50	81	7.43
64	9.28	47	8.91	45	8.47	86	7.42
92	9.28	31	8.90	12	8.45	16	7.32
18	9.23	66	8.88	77	8.43	50	7.27
76	9.23	17	8.83	8	8.38	100	7.25
49	9.16	96	8.77	89	8.37	39	7.23
72	9.14	25	8.75	93	8.37	6	7.17
37	9.11	65	8.74	56	8.35	98	7.10
44	9.11	99	8.73	59	8.35	10	6.97
71	9.11	58	8.72	46	8.32	54	6.90
1	9.09	73	8.72	61	8.32	23	6.57
43	9.07	80	8.72	82	8.30	94	6.54
42	9.05	83	8.72	79	8.22	60	6.46
22	9.02	75	8.71	57	8.19	11	6.10
24	9.02	28	8.70	52	8.11	13	6.09
55	9.02	62	8.70	9	8.10	38	5.83
15	9.01	95	8.69	67	7.81	97	5.23
33	9.01	21	8.62	20	7.80	5	4.23
69	9.01	40	8.62	84	7.79	7	3.83
51	8.99	30	8.56	26	7.73	32	2.79

99% confidence interval about the overall mean, 7.74-8.78, was calculated. Items with mean ratings within this interval were considered not to be significantly different from the average in rated importance. Items with mean ratings above the upper confidence limit, 8.78, were considered to be significantly above the average in rated importance. This latter set of items contains the 36 most highly related items that are listed at the beginning of this section. The number of items in this list could be increased or decreased by making the confidence interval more lenient or more stringent, respectively. The choice of a 99% confidence limit used here is in accordance with recommended statistical practice when degrees of freedom are very large for the denominator of the F test.¹⁰

¹⁰ Miller, I., & Freund, J. E. **Probability and statistics for engineers.** Englewood Cliffs, NJ: Prentice-Hall, Inc., 1965.

APPENDIX B

**100 Item Survey Instrument
Motor Sergeants Skills Aptitudes
(and Answer Sheet)**

SURVEY

MOTOR SERGEANT SKILLS APTITUDES

Organizational maintenance success revolves around the Motor Sergeant.

We need to know what special skills, aptitudes and knowledges he has.

We'll use the results to develop a training program for new Motor Sergeants.

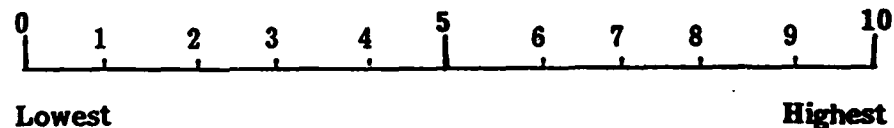
The information we are gathering is for research use only.

Note we do not ask for your name. This is not a test.

We would like you to respond to each question by rating each one on a 10-

point scale. (A rating of 1 is lowest. A rating of 10 is the highest possible.)

RESPONSE SCALE



The questions are in random order. Respond to each question independently.

There are no right or wrong answers.

The interviewer will record your ratings. You have nothing to write.

ANACAPA SCIENCES, INC.

P.O. Drawer Q

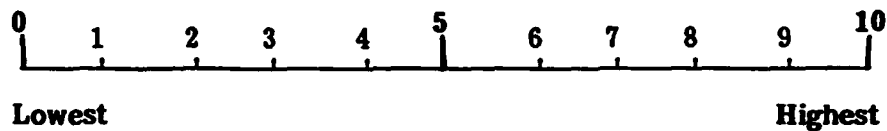
Santa Barbara, CA 93105

RESPONSE SCALE



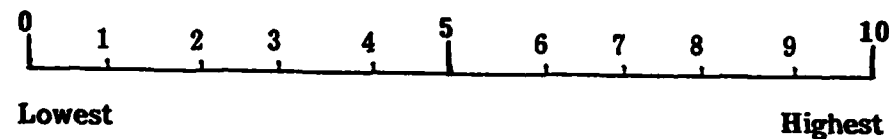
1. How would you rate a Motor Sergeant's need for skill at maintaining good relationships with officers, men, and other Motor Sergeants?
2. How would you rate a Motor Sergeants's need for flexibility in meeting unusual demands (i.e., reacting to "crisis" situations)?
3. Rate how important it is for a Motor Sergeant to be present at all times maintenance is being done.
4. How important do you feel it is for a Motor Sergeant to understand and interpret maintenance records and documents (such as work orders and MCS printouts)?
5. How important is speed of getting jobs finished to Motor Sergeant's effectiveness?
6. How important is it for a Motor Sergeant to have charts, records, and scheduling boards visible in his office?
7. How important is it that a Motor Sergeant becomes involved in specific repair tasks himself?
8. Rate the importance of a Motor Sergeant's need to be able to plan training to correct mechanic's training deficiencies.
9. How would you rate a Motor Sergeant's need to practice human relation program concepts on the job?
10. How important is it that a Motor Sergeant shows aptitude for outsmarting the system?
11. How important is a Motor Sergeant's skill at keeping a low profile and "not making waves?"
12. How important is it for a Motor Sergeant to give his men immediate feedback on their work?
13. How would you rate the skill of a Motor Sergeant who only assigns work to the most experienced mechanics?
14. Rate the need for a Motor Sergeant to be able to organize a maintenance section or platoon so that it will run smoothly in his absence.

RESPONSE SCALE



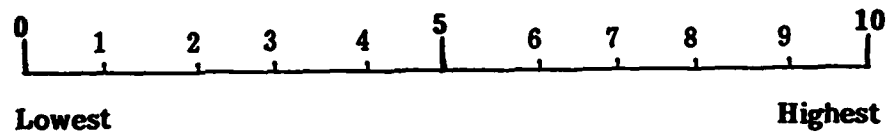
15. How would you rate a Motor Sergeant's need for skill at managing his time?
16. How important is it that a Motor Sergeant has detailed knowledge of resources available for training such as TEC tapes, TM, films, and video tapes.
17. How important is it that a Motor Sergeant gives a hands-on demonstration of a new task to his mechanics?
18. Is it important that a Motor Sergeant makes the men aware he is available to listen to their complaints or problems?
19. How important is it for a Motor Sergeant to have skills in recognizing critical errors during maintenance repairs?
20. How important is it that a Motor Sergeant has strong skills at writing maintenance reports and other technical documents?
21. How would you rate a Motor Sergeant's effectiveness based on a specific effort to motivate his personnel?
22. How important is it that a Motor Sergeant has strong skills in discussing maintenance needs with mechanics and crewmen?
23. How would you rate the effectiveness of a Motor Sergeant who spends most of his time at his desk?
24. How important is it for a Motor Sergeant to have hands-on ability to check and inspect work?
25. Rate how important it is that a Motor Sergeant should have skill in conducting structured on-the-job training (i.e., demonstrating, explaining the task to be trained)?
26. How would you rate the need for a Motor Sergeant to be skilled in performing every organizational maintenance task?
27. How would you rate a Motor Sergeant's effectiveness who complains about or criticizes his men publicly?
28. How important is it that a Motor Sergeant understands the content of written materials easily and quickly?

RESPONSE SCALE



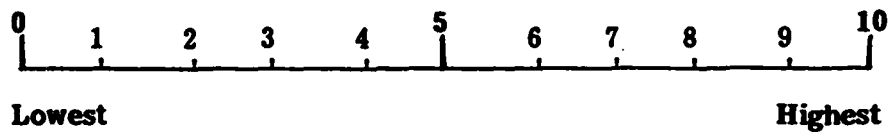
29. How important to a Motor Sergeant's effectiveness is conducting maintenance training?
30. How important is it that a Motor Sergeant is skilled at counseling his men on personal matters?
31. How important is it that a Motor Sergeant stands up for what he believes at the risk of personal difficulties?
32. How would you relate passing command maintenance inspections as a function of a Motor Sergeant's effectiveness?
33. How important is it for a Motor Sergeant to rotate tasks among all levels of experience?
34. How important would you rate a Motor Sergeant's ability to enforce rules of dress and conduct for his troops?
35. How important are neat, clean shops and working areas as an indicator of a Motor Sergeant's effectiveness?
36. How important is it for a Motor Sergeant to relate maintenance to unit mission readiness?
37. How important is it that a Motor Sergeant keeps abreast of technical changes and modifications to equipment and publications?
38. How would you rate the effectiveness of a Motor Sergeant who does all troubleshooting himself before assigning repair tasks to mechanics?
39. How important is it that a Motor Sergeant ensures that his mechanics are cross-trained on each other's tasks (e.g., turret on automotive)?
40. How important is it for a Motor Sergeant to demonstrate effective work habits (such as handling paperwork quickly, setting up a personal schedule, having a priority system for dealing with paperwork, etc.)?
41. How important is it that a Motor Sergeant treats all mechanics on an equal basis regardless of their personal characteristics or experience?
42. How important is it for a Motor Sergeant to be able to evaluate the quality of work on a finished job?

RESPONSE SCALE



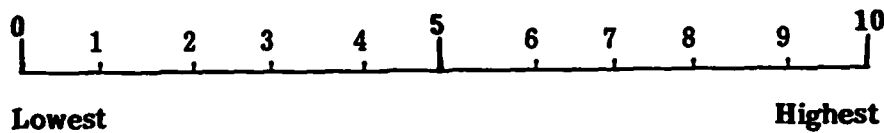
43. How would you rate the need for a Motor Sergeant to be totally familiar with special maintenance tools and test equipment?
44. How important is it for a Motor Sergeant to guide and counsel mechanics on correct maintenance procedures?
45. How important is it that a Motor Sergeant is able to discuss and interpret command decisions for his men?
46. How important is a Motor Sergeant's ability to discipline soldiers for recognized offenses?
47. How important is it for a Motor Sergeant to have a high degree of skill in completing and checking Army forms and records?
48. How important would you rate a Motor Sergeant's need for skill in coordinating with other sections and companies?
49. How important would you rate a Motor Sergeant's need to update his own skills and knowledges?
50. How would you rate a Motor Sergeant's effectiveness who constantly revises his own orders?
51. How would you rate the importance of a Motor Sergeant's aptitude for planning and organizing his work day?
52. How effective would you rate a Motor Sergeant who is usually the first one to arrive in the morning?
53. Rate the need for a Motor Sergeant to have strong skills in scheduling personnel and work.
54. How would you rate the effectiveness of a Motor Sergeant who criticizes superior officers in front of his men?
55. How important is it that Motor Sergeant lets his mechanics show initiative?
56. How important is it that a Motor Sergeant refer to the technical manuals when doing or checking a job?

RESPONSE SCALE



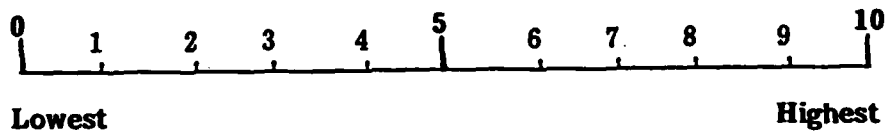
57. Rate how important it is for a Motor Sergeant to have skill in developing special training sessions or lessons for his own men.
58. How important is it that a Motor Sergeant knows proper sequences and standards for corrective maintenance tasks?
59. How important is it for a Motor Sergeant to spend extra time with new men to help them get oriented?
60. How would you rate the notion that a Motor Sergeant allows his personnel freedom of action in performing their duties?
61. How would you rate the effectiveness of a Motor Sergeant who is usually the last one to leave work each day?
62. How important is it for a Motor Sergeant to be highly skilled at motivating men under his command to perform above the average?
63. Rate how important it is for a Motor Sergeant to display his own initiative in solving problems on job-related matters.
64. How do you rate a Motor Sergeant's need for ability to work under time/deadline pressure?
65. How would you relate the effectiveness of the preparation for field exercises to a Motor Sergeant's skill in planning?
66. How important is it that a Motor Sergeant can obtain needed repair parts from other sources if the normal supply system breaks down?
67. How important is it for a Motor Sergeant to do more than is required?
68. How important is it for a Motor Sergeant to ensure that his men know exactly what is expected of them?
69. How important is it that a Motor Sergeant listens to suggestions on technical matters from his men?
70. How would you rate a Motor Sergeant's need to support his mechanics in a confrontation with superior officers?

RESPONSE SCALE



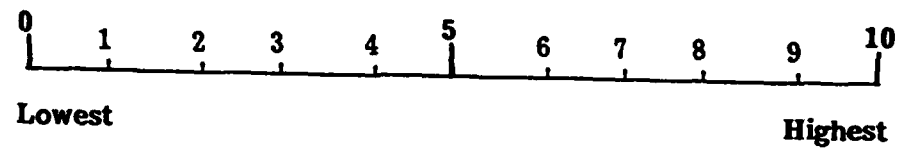
71. How important is it for a Motor Sergeant to recognize that his men need training on maintenance tasks?
72. How important is it for a Motor Sergeant to have detailed knowledge of troubleshooting?
73. How important is it that a Motor Sergeant ensure that all men get exposure to all tasks?
74. How important is it that a Motor Sergeant be an authority on PLL and other repair parts supply activities?
75. What is the relationship of a Motor Sergeant's effectiveness to the quality of work done by his shop?
76. Rate how important it is that a Motor Sergeant has strong skills in allocating resources such as tools, materials, and men to accomplish his maintenance mission.
77. How important is it that a Motor Sergeant ensures personnel are trained as back-up for critical positions (such as TAMMS and PLL clerks)?
78. How important is it for a Motor Sergeant to be aware of his personnel's whereabouts during working hours?
79. How important is it that a Motor Sergeant establishes and maintains personal contact with supporting maintenance personnel?
80. How important is it that a Motor Sergeant makes conscious effort to gain the respect of his subordinates?
81. How important is it for a Motor Sergeant to be present during scheduled periods of preventive maintenance?
82. Rate the need for a Motor Sergeant to be skilled in planning and arranging maintenance activities.
83. How important is it for a Motor Sergeant to have skill in presenting differences of opinions with support and battalion maintenance?
84. How important is it that a Motor Sergeant shows aptitude for working "within the system"?

RESPONSE SCALE



85. How would you rate the effectiveness of a Motor Sergeant who uses fear (and disciplinary methods) as a way of getting work done?
86. How important is it that a Motor Sergeant is considered to be the best mechanic among his men?
87. How important is it that a Motor Sergeant has strong skills in discussing maintenance organization problems with other Motor Sergeants?
88. How important is it that a Motor Sergeant has detailed knowledge of how TAMMS operates?
89. How important is it that a Motor Sergeant has strong visibility by walking around and checking work?
90. How important is it that a Motor Sergeant tells his men the importance of their job?
91. How would you rate the need for a Motor Sergeant to have detailed knowledge of the contents of technical manuals (TM) and other technical publications?
92. How important is it that a Motor Sergeant goes to other "experts" if he has a technical problem on a maintenance task?
93. How important is it that a Motor Sergeant has strong skills in discussing maintenance organization problems with superior officers?
94. How important is it that a Motor Sergeant supervises his personnel very closely?
95. How would you rate a Motor Sergeant's effectiveness who assigns the job and lets the mechanic do it without interference?
96. How important is it that a Motor Sergeant keeps command informed about motor pool operations?
97. How important is it that a Motor Sergeant has a strong concern with pleasing superiors?
98. How would you relate the general appearance of the tool room to a Motor Sergeant's effectiveness?

RESPONSE SCALE



99. How important would you rate a Motor Sergeant's ability to keep records, including TAMMS forms)?
100. How do you rate a Motor Sergeant's effectiveness who waits for problems to occur and then tries to solve them?

ANSWER SHEET
Motor Sergeants Skills Aptitudes Survey

MOS: _____			
Duty Position: 1 2 3		Months in Position: _____	
Rank: _____		Years in Army: _____	

_____ 1	_____ 26	_____ 51	_____ 76
_____ 2	_____ 27	_____ 52	_____ 77
_____ 3	_____ 28	_____ 53	_____ 78
_____ 4	_____ 29	_____ 54	_____ 79
_____ 5	_____ 30	_____ 55	_____ 80
_____ 6	_____ 31	_____ 56	_____ 81
_____ 7	_____ 32	_____ 57	_____ 82
_____ 8	_____ 33	_____ 58	_____ 83
_____ 9	_____ 34	_____ 59	_____ 84
_____ 10	_____ 35	_____ 60	_____ 85
_____ 11	_____ 36	_____ 61	_____ 86
_____ 12	_____ 37	_____ 62	_____ 87
_____ 13	_____ 38	_____ 63	_____ 88
_____ 14	_____ 39	_____ 64	_____ 89
_____ 15	_____ 40	_____ 65	_____ 90
_____ 16	_____ 41	_____ 66	_____ 91
_____ 17	_____ 42	_____ 67	_____ 92
_____ 18	_____ 43	_____ 68	_____ 93
_____ 19	_____ 44	_____ 69	_____ 94
_____ 20	_____ 45	_____ 70	_____ 95
_____ 21	_____ 46	_____ 71	_____ 96
_____ 22	_____ 47	_____ 72	_____ 97
_____ 23	_____ 48	_____ 73	_____ 98
_____ 24	_____ 49	_____ 74	_____ 99
_____ 25	_____ 50	_____ 75	_____ 100

APPENDIX C

Maintenance Management Training Resource List*

***NOTE:** Resource development is a dynamic process whereby deletions and additions are constantly being made to the resource listings. Although the list provided here was current during the research, we assume it will be reviewed and updated during curriculum development.

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Title	Page
Army Correspondence Course Program (ACCP)	79
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ARMY CORRESPONDENCE COURSE PROGRAM (ACCP)*

IS 0001	NCO Leadership - Career Development
IS 0005	Wheeled Vehicle Organizational Maintenance
IS 0007	Tracked Vehicle Organizational Maintenance (Automotive)
IS 0008	Organizational Maintenance of Tracked Vehicle (Armament)
IS 0012	Vehicle Recovery, General Subjects
IS 0086	Vehicle Recovery
IS 0200	Records Management
IS 0259	Basic Principles of Military Justice
IS 0260	Advanced Principles of Military Justice
IS 0268	Organizational Maintenance
IS 0269	Divisional Maintenance Operations
IS 0270	Organizational Maintenance & Maintenance Management
IS 0297	Company Administration - Publications, Records, & Personnel Management
OD 0531	Mechanical Maintenance of Tactical Wheel and Track Vehicles
OD 0720	Maintenance Management & Supply Procedures I
OD 0721	Maintenance Management & Supply Procedures II
OD 0729	Tracked Vehicle Maintenance
OD 0730	Wheeled Vehicle Maintenance
OD 0733	Heavy Equipment Recovery Procedures
OD 0820	Training
OD 0833	Inspections
OD 0834	Military Publications
OD 0835	Unit & Organizational Supply

***ACCP Designators**

IS - Interschool
OD- Ordnance
AR- Armor
RC- Elements of Motor Sgt. Correspondence Course
HK)
HB)- Complete courses consisting of a series of
HC)- lessons on various elements of maintenance or repair.
SY)

ACCP (Continued)

OD 0836	Organizational Maintenance
OD 9839	Maintenance Management (Mission)
OD 0914	Maintenance Management I
OD 0915	Maintenance Management II
OD 0917	Army Materiel PM
RC 1007	Shop Area Layout
RC 1011	Preparation of Maintenance
RC 1018	Maintenance Training Programs
RC 1019	Group Training Techniques
RC 1062	Preparation and Consolidation of DA Form 2406
RC 1065	Conducting Motor Stables

Complete ACCP Courses Containing a Series of Individual Lessons

HB 6301	Introduction to Wheeled Vehicle Maintenance
HB 6309	Maintenance Procedures
HC 6301	Introduction to Tracked Vehicle Maintenance
HK 4501	Introduction to Tank Turret Maintenance
SY 6301	Organizational Maintenance for Systems Mechanic M60A1; M60A3 & M728 Armament
SY 6304	Test Measurement & Diagnostic Equipment for Systems Mechanic
SY 6307	Organizational Maintenance for Systems Mechanic M113A1 & M548 Cargo Carrier
SY 6308	Recovery Fundamentals for Systems Mechanic
SY 6311	Organizational Maintenance for Systems Mechanic M88/M88A1 & M578 Light Recovery Vehicle
SY 6313	Organizational Maintenance for Systems Mechanic of M151 (Automotive)
SY 6314	Organizational Maintenance for Systems Mechanic of M35 Series Vehicles
SY 6316	Organizational Maintenance for the Systems Mechanic
SY 6317	Organizational Supply Management for the Systems Mechanic
SY 6318	Training Management for the System Mechanic

ACCP (Continued)

Armor - Specific Courses

AR 0041	Safety Management
AR 0100	Operator/Crew Maintenance Fundamentals
AR 0102	Tank Crew Maintenance
AR 0400	Platoon Maintenance Fundamentals
AR 0401	Armored Vehicle Maintenance
AR 0402	Maintenance Inspection & ESC
AR 0403	Vehicle Recovery, Basic
AR 0430	Management Practices
AR 0431	Military Instruction
AR 0440	Techniques of Effective Instruction
AR 0500	Maintenance Forms and Records
AR 0503	Vehicle Recovery, Advanced
AR 0504	Materiel Readiness
AR 0540	Training Management

Supply Specific Courses

QM 0012	Unit & Organizational Supply, Part I
QM 0013	Unit & Organizational Supply, Part II

ARMY REGULATIONS (AR)

11-14	Logistics Readiness
27-10	Military Justice
58-1	Management, Acquisition and Use of Motor Vehicles
140-15	Maintenance of Equipment
220-1	Unit Readiness Reporting
310-1	Publications, Blank Forms, and Printing Management
310-2	Identification and Distribution of DA Publications, Issue of Agency and Command Administration Publications
340-2	Maintenance and Dispensation of Records in TOE Units of Active Army and Army Reserve
340-6	Maintenance and Disposition of Records in Organic Units of the Active Army
340-15	Preparing Correspondence
340-18-1	The Army Functional File System
350-1	Army Training
351-1	Individual Military Education and Training
600-20	Army Command Policy and Procedures
600-200	Enlisted Personnel Management System
611-201	Enlisted Career Management Fields and MIL Occupational Specialities
640-10	Individual Military Personnel Records
700-18	Provisioning of U.S. Army Equipment
750-25	Test, Measurement, and Diagnostic Equipment (TMDE) Calibration
750-34	Preventive Maintenance of Lead-Acid Batteries
750-43	Test, Measurement and Diagnostic Equipment

DEPARTMENT OF THE ARMY PAMPHLETS (DAPAM)

- 5-2 Improvement Tools for Soldiers' Managers**
- 5-4-6 Work Scheduling Handbook**
- 108-1 Index of Army Motion Pictures & Related A/V Aids**
- 310-1 Index of Administrative Publications**
- 310-2 Index of Blank Forms**
- 310-3 Doctrinal, Training & Organizational Publications (FM,TOE, TC)**
- 310-4 Index of Technical Publications**
- 310-6 Index of Supply Catalogs and Materials**
- 310-7 U.S. Army Equipment Index of Modification Work Orders (MWO)**
- 310-10-2 Standard Army Publication System (STARPUBS)**
- 310-12 Index and Description of Army Training Devices**
- 351-4 U.S. Army Formal School Catalog**
- 351-10 (AR 351-1)**
- 351-20-2 Correspondence Course Catalog - Armor**
- 351-20-13 Correspondence Course Catalog - Ordnance**
- 385-1 Unit Safety Management**
- 700-1 Supply Management Handbook**
- 700-2 Commander's Supply & Maintenance Handbook**
- 750-1 Maintenance Guide for Leaders**
- 750-4 Commander's Maintenance Evaluation Technical Guide**
- 750-18 Commander's Maintenance Guide**
- 750-22 Troubleshooting Equipment in Combat Units**

EXPORTABLE/EXTENSION TRAINING MATERIALS (ETM)

QMS N1PUB 339 (E)	TAMMS
QMS N1PUB 339 (E) 80L	Solutions
ARM 1C-20	Turret Inspection Checklist
QMS N1PUB 312 (E)	Unit and Organization Supply
QMS 50.245 HI	Inventory PLL
QMS 50.245 PE2	Inventory PLL
LOG 87	DLog Motor Sgt Course (Seventh Army)

FIELD MANUALS (FM)

9-63N3	Soldier's Manual, MOS 63N, M60A1/A-3 Tank System Mechanic, SL3
9-63N4	Soldier's Manual, MDS63N, M60A1/A-3 Tank System Mechanic, SL4
20-22	Vehicle Recovery Operations
21-6	How to Prepare and Conduct Military Training
21-13	The Soldier's Guide
21-305	Manual for Wheeled Vehicle Driver
25-2	Unit Commander's Guide
27-1	Legal Guide for Commanders
29-2	Organizational Maintenance Operations
29-27	Calibration Service in the Theater of Operations
29-30-1	Divisional Maintenance Battalion
43-1(Test)	Organizational Maintenance Manager's Guide
43-1-1	Organizational Maintenance Manager's Guide Indicator List
100-5	Operations

GRAPHIC TRAINING AIDS (GTA)

Charts (C)

C 17-2-7 M60 Walk-Around Inspection

C 9-1-186 Systematic Inspection Procedures for 1½ Ton Truck

C 27-1-2 Army Rules for Imposing Nonjudicial Punishment for Minor Offenses

Slides & Charts (SLC)

9-1-182 Preventive Maintenance Wheeled Vehicle

Transparencies & Charts (TC)

12-7-9 PT Army Functional File System

9-1-166 Tank Combat, M60/A1, Organizational Maintenance

9-1-168 Tank Combat, M60/A1, Organizational Maintenance, Hull (Automotive)

9-1-169 Tank Combat, M60/A1, Organizational Maintenance, Fire Control

MISCELLANEOUS MATERIALS (MM)

BTMS-AC-80-2	Battalion Training Management System
FK CL-1	Armor Correspondence Course Catalog
FK CL-2	Catalog of Instructional/Reference Material
FK CL-3	Videotape Catalog
FK PH-29	Example 80P for The Tank Company
PS Magazine	—
SB 700-200	Army Adopted/Other Items Selected for Authorization/List of Reportable Items
SR-1	Sergeant Majors' Academy, SM 347031, Supplemental Reading 1
TOE 29-60044	Organizational Maintenance Teams: Organization & Equipment

TECHNICAL BULLETINS (TB)

- 43-0210 Non-aeronautical Equipment, Army Oil Analysis Program (AOAP)**
- 43-0211 Army Oil Analysis Program (AOAP) Users' Guide**
- 43-180-1 Calibration Requirements for the Maintenance of Army Materiel**

TECHNICAL MANUALS (TM)

TM's

9-243	Use and Care of Hand Tools & Measuring Tools
21-300	Driver Selection and Training (Wheeled Vehicle)
21-301	Driver Selection, Training and Supervision (Tracked Vehicle)
21-306	Manual for the Tracked Combat Vehicle Driver, 5 Ton Trucks
38-17	Logistics Management
38-750	The Army Maintenance Management System (TAMMS)
38-L22-15-1	Functional Users' Manual for Division Logistics System (DLOGS), System Description
38-L22-15-2	Functional Users' Manual for Division Logistics System, Using Unit Procedures
- 10 Series)
- 20 Series) Technical Manuals Specific to Equipment in Unit
- 20P Series)

TRAINING CIRCULARS (TC)

TC's

		Special Text	Program Text
21-5-7	Training Management in Battalions		
21-5-3	TEC Management Instruction		
ST 9-195-1	Organizational Maintenance and Supply	X	
ST 17-154	Organizational Maintenance Program	X	
ST 17-160	The Army Maintenance System		X
ST 17-161	Maintenance Management	X	
ST 17-162	Repair Parts Supply & PLL		X
ST 17-165	Maintenance Publications		X
WH-2	Training Management		X

TRAINING EXTENSION COURSE -3/4" VIDEO (TEC-V)

2E-171-0168B	Safety: Shop and Maintenance Areas
2E-171-0247B	Track Suspension Preventive Maintenance
2E-171-5011B	Maintenance Inspection Evaluation Standards
2E/020-171-1105B	Vehicle Recovery
2E/909-171-1049B	Management Practices in TOE Units
7B-171-6035B	Training Management for Armor Leaders
020-171-7038B	Performance-Oriented Training
42-171-9055B	Vehicle Recovery: Company Level
610-09-0865B	Using the Microfiche Reader
641-091-0817B	Common Hand Tools
690-091-0418B	Care and Use of Hand Tools
720-053-0076B	Shop Safety
909-171-0504B	Collective Training
909-171-1224B	MAP-TOE Manager's Handbook
909-171-1225B	MAP-TOE Manager's Prologue
909-171-1226B	MAP-TOE Manager's Epilogue
909-171-7028B	Performing Training Demonstrations
910-113-0501B	Inspection of DA Form 2404
910-171-8067B	DA Maintenance Forms

TRAINING EXTENSION COURSE - AUDIO/VISUAL - (TEC-A)*

500-121-8125F	Introduction to Posting DA Publications
500-121-8126F	Posting DA Publications
510-091-6451F	Preparing & Maintaining DA Form 2401 & Dispatch Equipment
510-091-6454F	Prepare and Maintain DA Form 348
510-091-6456F	Preparation of DA Form 2404, Part I
510-091-6457F	Preparation of DA Form 2404, Part II
510-091-6459F	Preparing, Maintaining and Using DA Form 2407, Part 1
510-091-6460F	Preparing, Maintaining and Using DA Form 2407, Part 2
510-091-6461F	Preparing, Maintaining and Using DA Form 2407, Part 3
510-091-6462F	Preparing, Maintaining and Using DA Form 2407, Part 4
510-091-6464F	Preparing, Maintaining and Using DA Form 314, Part 1
510-091-6465F	Preparing, Maintaining and Using DA Form 314, Part 2
510-091-6471F	Preparation and Maintenance of Equipment Logs
510-091-6472F	Preparing DA Form 2408-1
510-091-6474F	Preparing, Maintaining and Using DA Form 2408-14
551-101-7917F	Replacing PLL Items
551-101-7919F	Processing Reports for Supplies
551-101-7940F	Inventory Repair Parts
610-091-6155F	Recovering Mired Tank (Mech.)
910-071-0091F	Prepare and Conduct Training
or-071-0093F	Develop Training Objectives
901-071-0094F	Develop Intermediate Objectives
-071-0095F	Develop Lesson Plans
-071-0096F	Select Training Techniques
-071-0097F	Evaluating Training

*Developed for use on the BESELER CUE/SEE machine.

TEC-A (Continued)

944-171-0019F Wheeled Vehicle Recovery Operations
944-091-0007F System Inspection of 1½ ton M880 Truck
944-091-0002F System Inspection of 2½ ton M35 Truck, PTS 1
944-091-0003F System Inspection of 2½ ton M35 Truck, PTS 2
944-091-0004F System Inspection of 2½ ton M35 Truck, PTS 3
944-091-0005F System Inspection of 2½ ton M35 Truck, PTS 4

TRAINING EXTENSION COURSE - PRINTED MATERIAL (TEC-P)*

020-171-2000Y	Tank M60, Total ETM Package
010-171-2001Y	ETM Training Manager's Guide
500-121-8127A	Requesting DA Publications
510-091-6467A	Preparation & Consolidation of DA Form 2406
551-101-8232A	Preparing DA Form 2062 as a Shortage Annex
551-101-8235A	Updating a Shortage Annex (DA Form 2062)
610-091-9171Y	M809 Truck Mechanic (Organizational Maintenance) Training Manager's Guide
610-091-9191Y	M561 Truck Mechanic (Organizational Maintenance) Training Manager's Guide
610-091-9195Y	M44 Truck Mechanic (Organizational Maintenance) Training Manager's Guide
610-091-9197Y	M51/54 Truck Mechanic (Organizational Maintenance) Training Manager's Guide
610-091-6160J	PMCS Wheeled Vehicle Checklist
610-091-6163J	PMCS Checklist M60A1/A3 Tank System Mechanic
811-091-9104H	Performing PMCS, Part I
811-091-9105H	Performing PMCS, Part II

*A - Printed Text
Y - ETM Manager's Guide
J - Job Performance Aid
H - ETM Printed Lessons

TRAINING FILMS (TF)

MF-61-1432	Good Working Conditions
TF-9-3783	Recovery Vehicle, M578
TF-9-3790	Maintenance Shop Safety
TF-9-3791	Recovery Vehicle, M88 Part V
TF-9-3852	Maintenance Procedure, M151 Series, $\frac{1}{2}$ Ton Truck
TF-9-4187	Maintenance Schedule, Wheeled Vehicle
TF-9-4192	Maintenance Service Road Test
TF-9-4336	Categories of Maintenance
TF-9-4620A	Shop Safety
TF-21-4526	Performance Training
TF-38-3767	The Army Maintenance System

USAARMS SPECIAL INSTRUCT./REF. MATERIAL (SI/REF)

MP 30405 Organizational Maintenance Records
MP 31004 Materiel Readiness Report (DA 2406)
MP 31106 Repair Parts Supply & PLL
MP 33005 Maintenance Records Evaluation